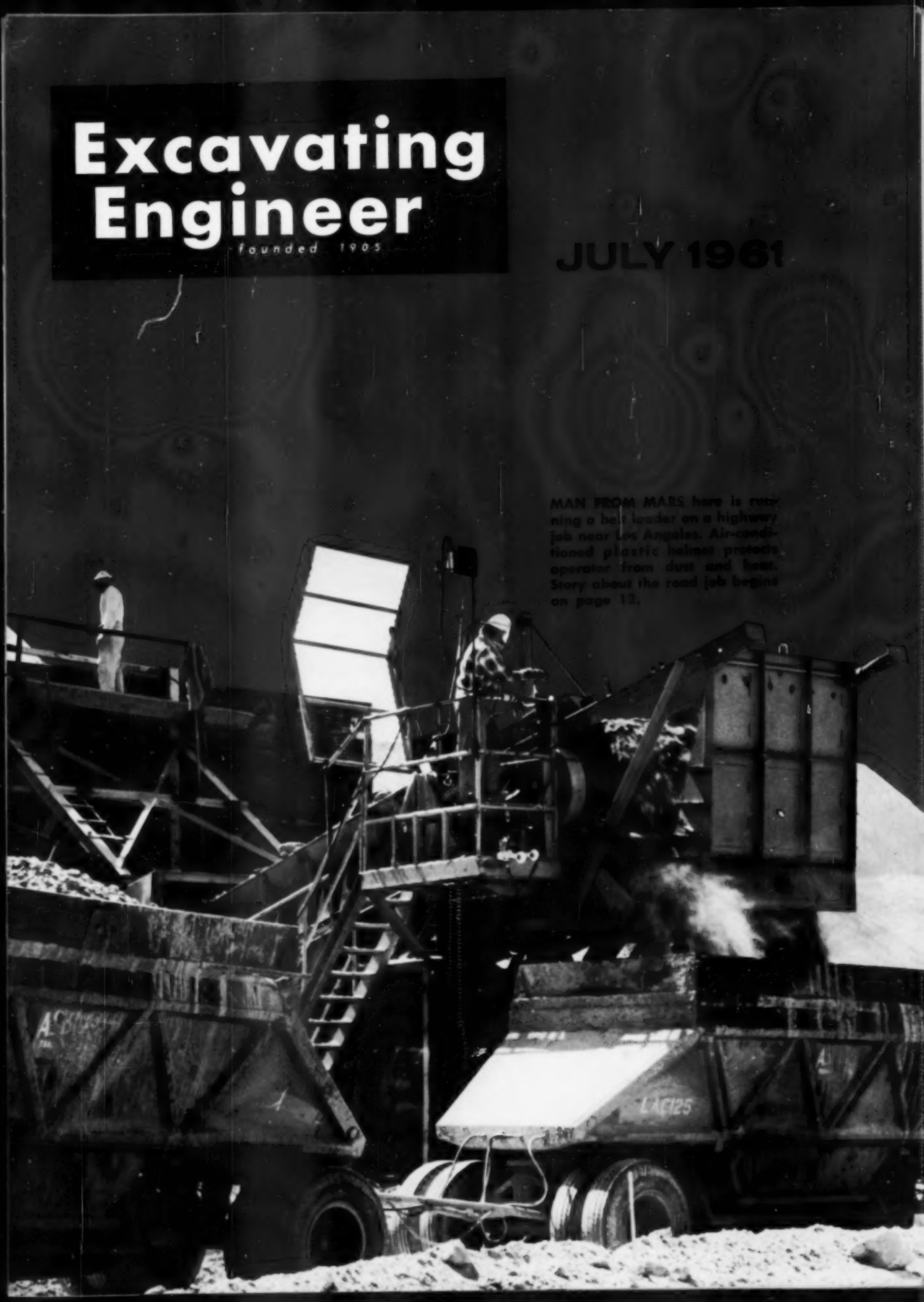
Excavating Engineer

founded 1905

JULY 1961



MAN FROM MARS here is running a belt loader on a highway job near Los Angeles. Air-conditioned plastic helmet protects operator from dust and heat. Story about the road job begins on page 12.

Here's why torque converter equipped machines do *more* work at *lower* operating cost

For higher work capacity on any given load, and for greater all-round daily production, more and more contractors are specifying torque converter drives in their new excavators, erecting cranes and loaders. And here are five good, profitable reasons why the torque converter is the preferred type of drive:

1. The torque converter eliminates lugging and stalling . . . permits engines to work at maximum efficiency delivering constant high-horsepower output for heavy digging loads and fast swinging.

2. *Smooth* converter power reduces peak loads throughout the machine's drive train because fluid within the converter absorbs much of the impact energy caused by quick drum speed change . . . thus protecting *both* driving and driven equipment.

3. When necessary, the torque converter smoothly delivers approximately twice normal torque to the drum, which, at slow digging speeds, represents an important advantage in power delivered to the dipper.

4. Cable life is extended since no sharp impact loads ever reach cables through the torque converter . . . constant line tension is maintained . . . there's no jerking or snapping.

5. An infinite variety of ratios is available to work with . . . permitting smooth, accurate, *safe control* of loads and delicate "inching" and "holding" under power . . . as well as adjusting for wide variations in dipper loading, substituting greater digging effort for speed, when required.

Wherever earth and rock are moved, wherever steel is erected, you'll find contractors using these five advantages . . . *to convert their horsepower into greater-than-ever profits!*

• • •

Twin Disc Torque Converters—*three-stage* or *single-stage*, from 30 to 1000 hp—are available from all leading manufacturers of heavy-duty machines. Be sure to specify one in your next unit. Take advantage of the five reasons why torque converter equipped machines do *more* work at *lower* operating cost.

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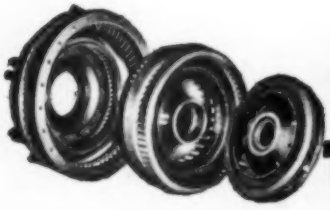

TWIN DISC

TWIN DISC

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TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • HYDRAULIC DIVISION, Rockford, Illinois

Excavating Engineer

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CONTENTS

Volume 55 No. 7 **July 1961**

Sepulveda Pass Road—by Ray Day
California's Biggest Highway Cut 12

Newest part of San Diego Freeway through Sepulveda Pass has plenty of engineering problems, including 15 million yards of roadway excavation in a single cut.

Lube Setup Speeds Servicing 18

High speed techniques of servicing vehicles reduces downtime to minimum. Lube oil standardization also cuts down inventory.

Underpinning Technique Speeds Excavation of Hotel Basement—
by E. E. Halmos 20

Basement for new downtown hotel in Washington, D. C. is a tricky excavation job, but foundation specialist firm has the right answers.

More Iron for Spain—by Mary Saint Albans 24

The nation's largest ore producing district in southern province of Granada greatly increases output in three years. A nine-shovel spread is at work full-time.

Asbury Fights Tides, Rain to Move 11,500 Yards Daily 29

Borrow pit for highway job is so close to the Pacific Ocean that it will eventually become part of a small boat marina.

Torque Converters—'Better' or Only 'Different'?—by G. W. Upp ... 32

Less than 20 years have passed since the first hydraulic torque converter was installed on a crane. Today one out of every three crane-excavators purchased is equipped with torque converter drive.

News from the Field 36

Preboring for Piles Eliminates Piledriving on Storm Sewer Job 36

90-Yd. Stripping Shovel Ordered by Pittsburg-Midway 36

Hudson Valley Predicted Cement and Concrete Leader 37

Iron Range To Be Developed On Central American Coast 37

Not in the Contract 38

Literature for Earthmovers 40

Equipment You Ought to Know About 42

Notes from the Manufacturers 50

Classified Advertising 52

Advertisers' Index 55

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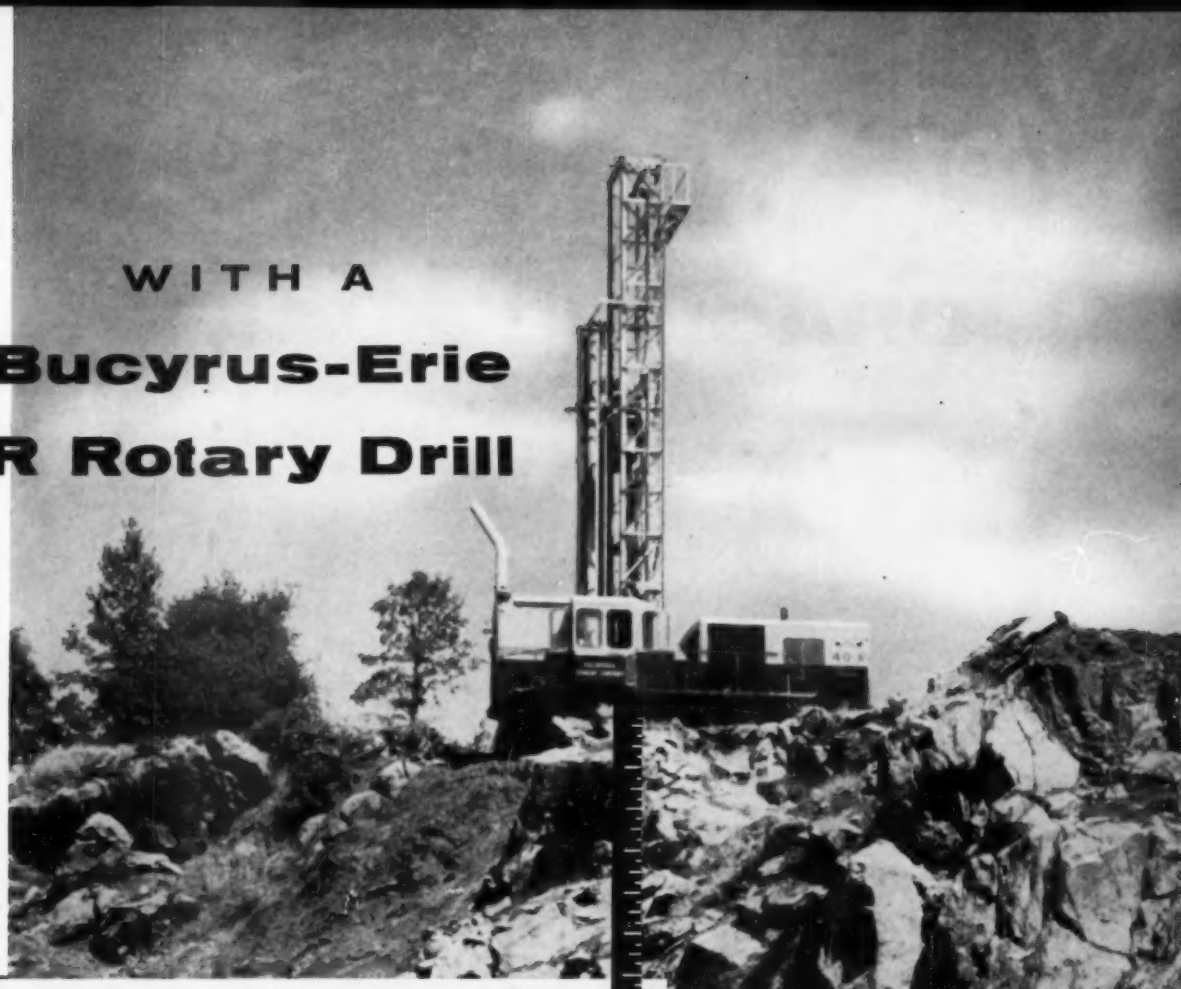

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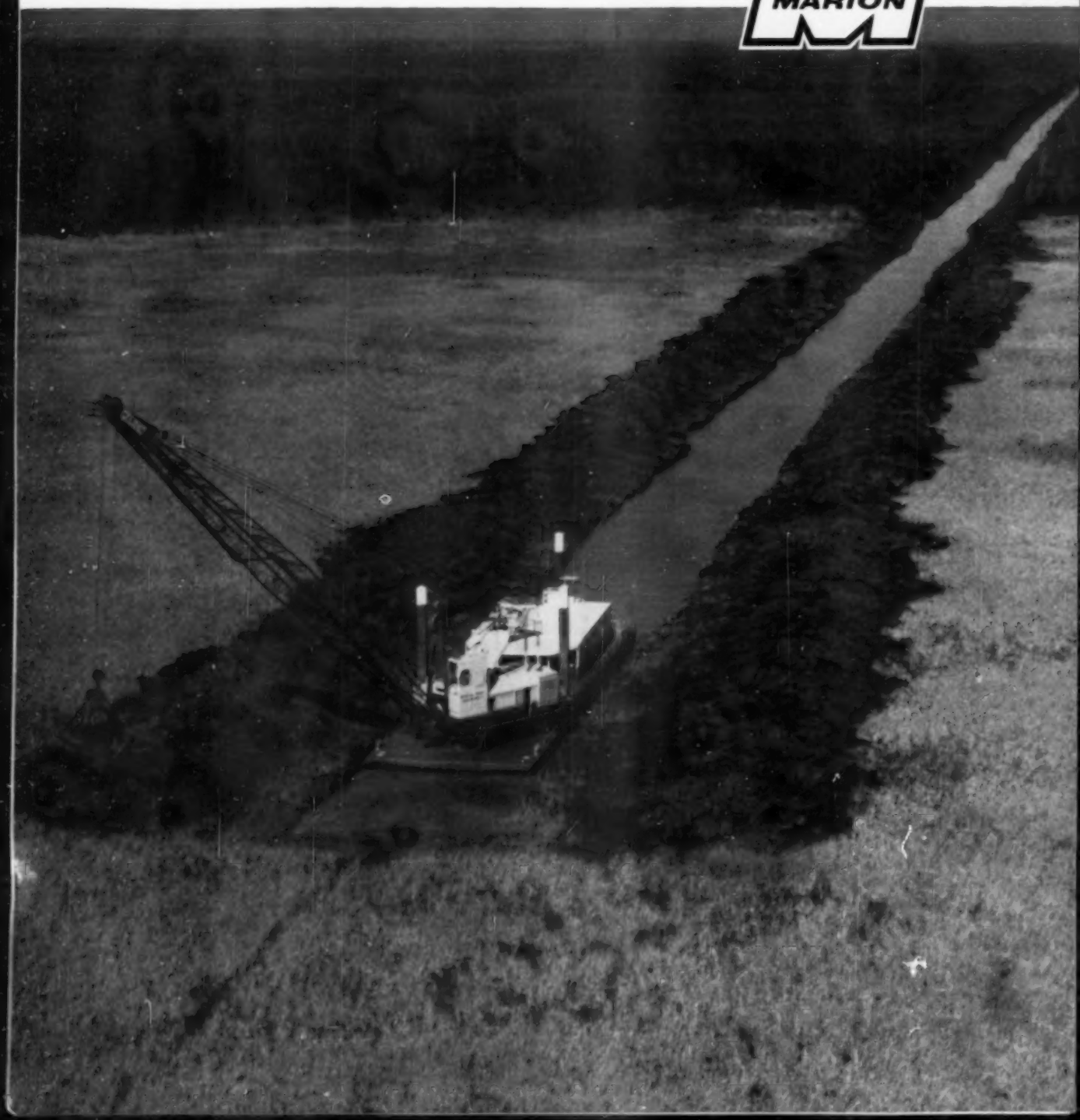
MARION



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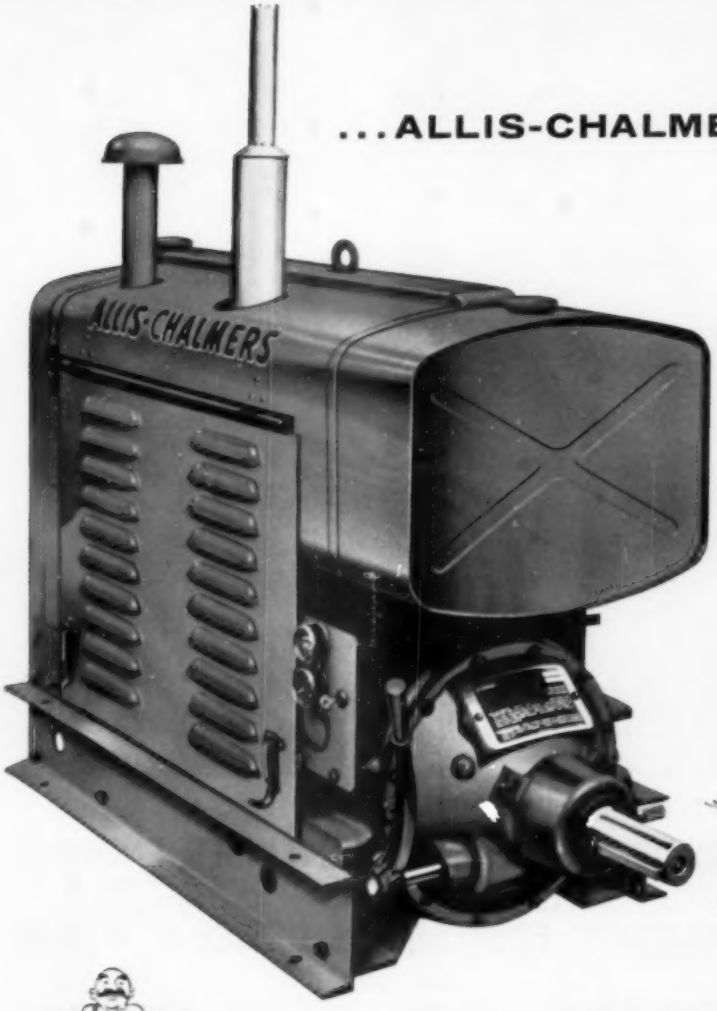

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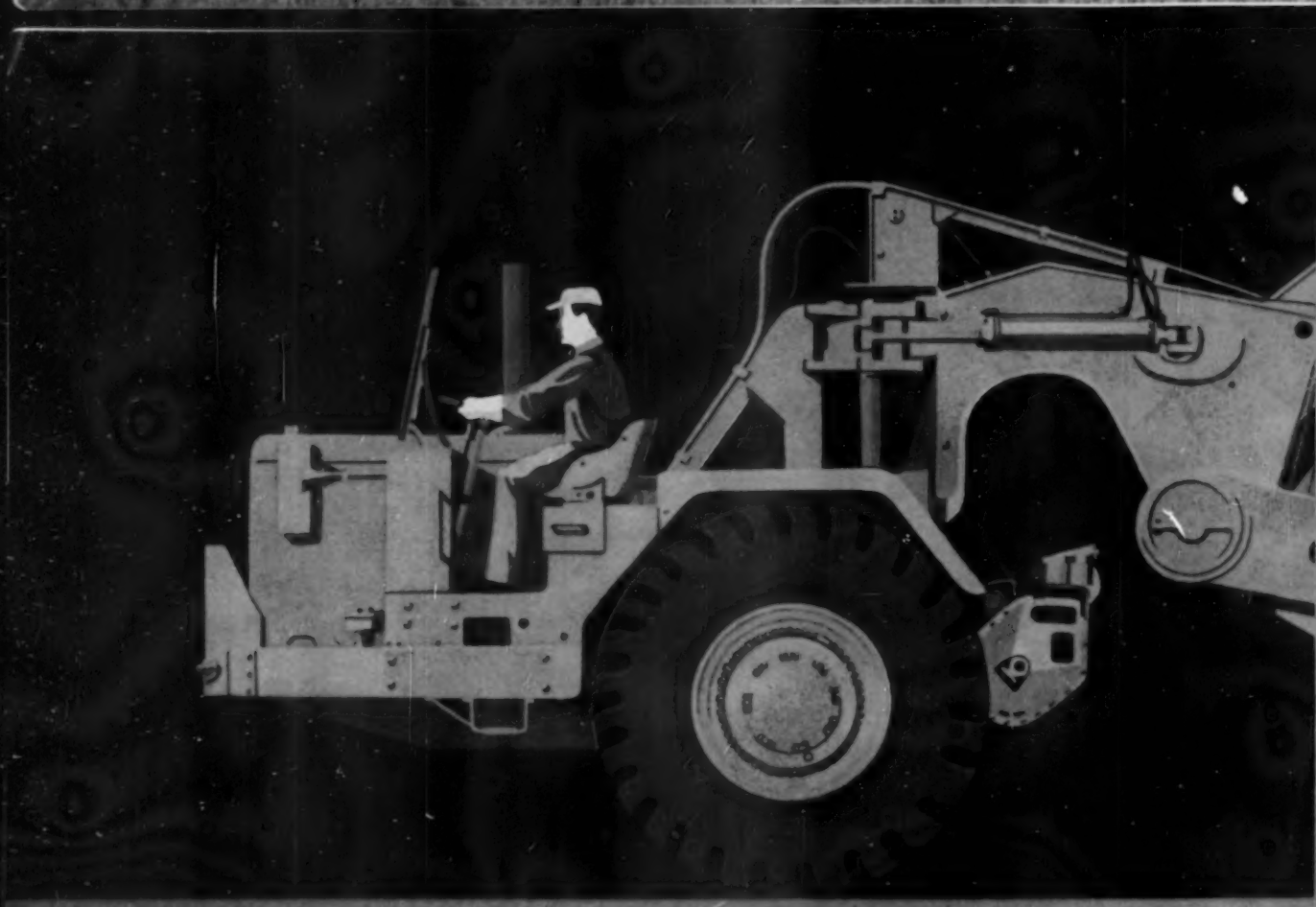

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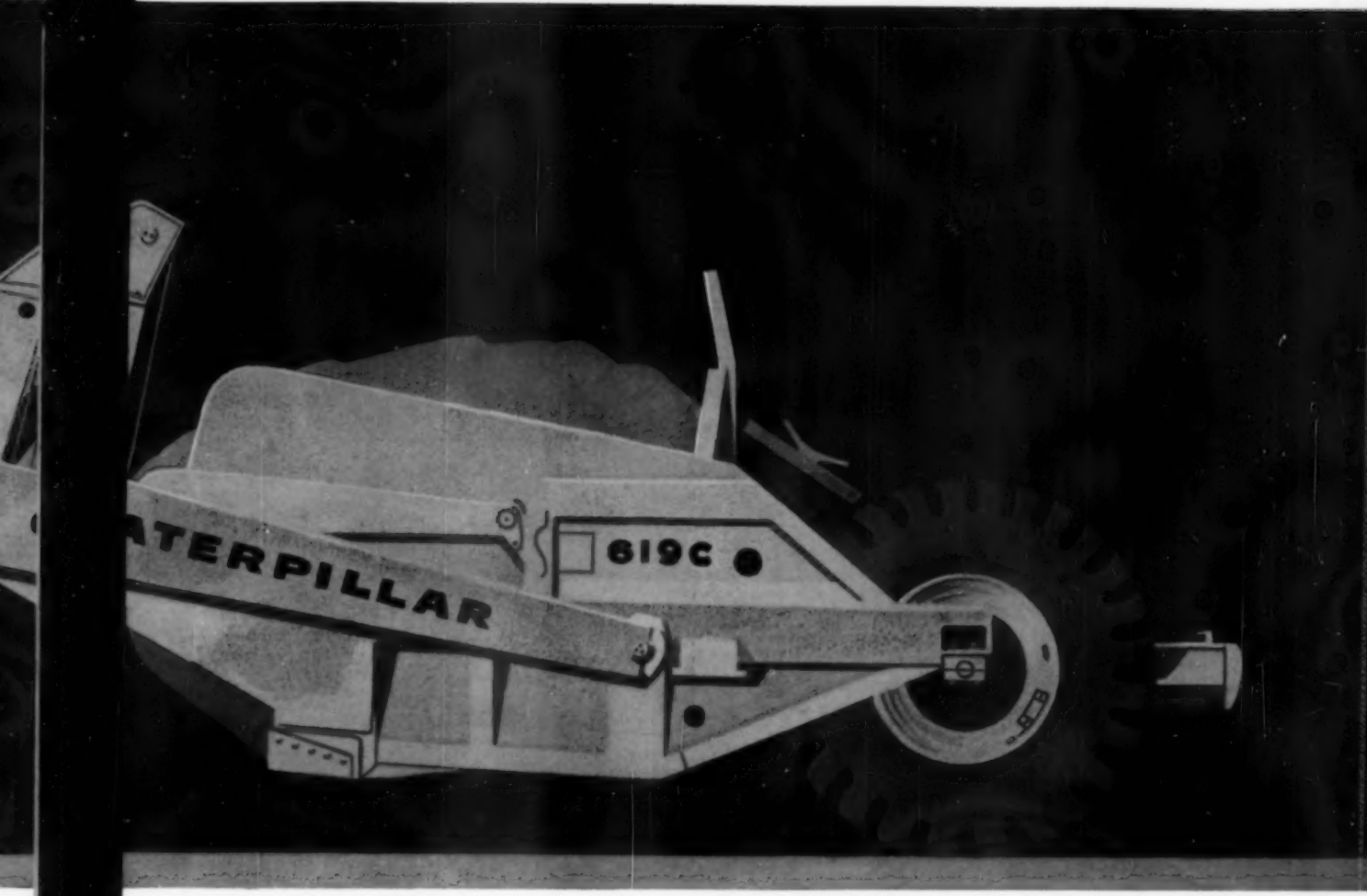
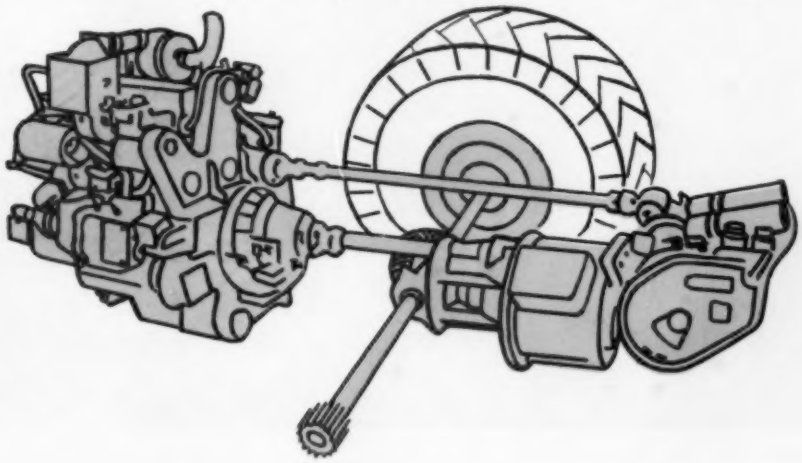


New 280 HP 619C offers choice of power shift transmission for faster, easier operation or direct drive transmission. Air actuated, live power cable control reduces operator effort. New, bigger 26.5 x 29 (22 ply) tires improve roadability. Top speed: 30 MPH. Capacity of matching Lowbowl scraper: 18 cu. yd. heaped, 14 cu. yd. struck. Also available: 25 ton PR619 Rear Dump Trailer built by Athey Products Corp.

New power shift transmission provides 9 speeds forward with just 3 shifts. One lever gives operator instant selection of 3 speed ranges . . . dial indicator tells him **when** to shift. Within each speed range, transmission **automatically** shifts to torque divider drive, direct drive or overdrive to match job conditions. The 619C with power shift transmission always operates at the right speed and power for the job at hand.

New, more powerful Cat D340 Engine (280 HP maximum, 250 HP flywheel at 1900 RPM). This economical 4-cylinder engine burns No. 2 fuel oil . . . has parallel-ported dual intake and exhaust valves and overhead camshafts for most efficient operation . . . has pressure ratio controlled turbocharger and aftercooler. Swingaway dash and pivoted crankcase guard simplify servicing. Unit construction assures easy servicing: engine, transmission, planetary final drives can be removed without disturbing adjacent components.



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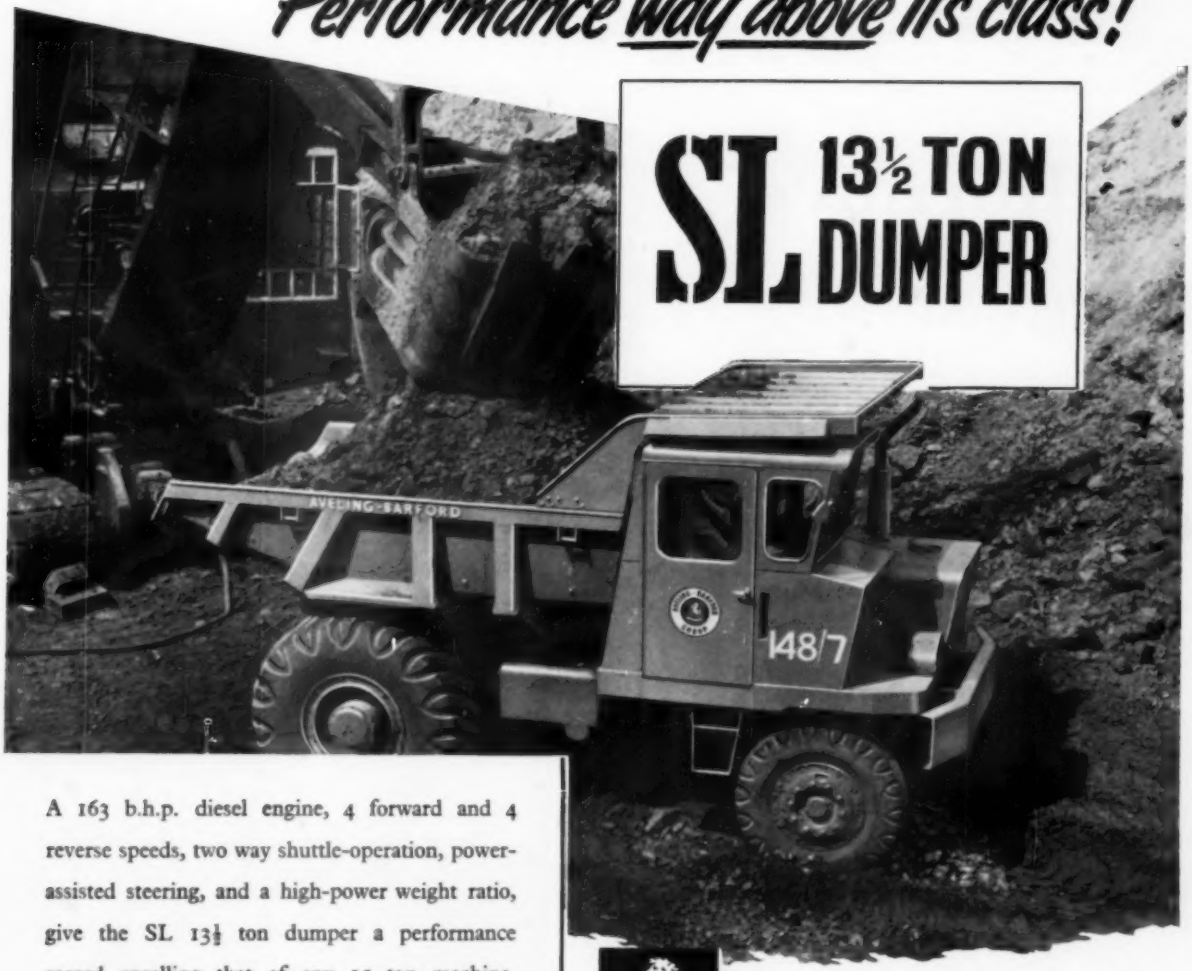

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JULY 1961

California's Biggest Highway Cut

Newest part of San Diego Freeway through Sepulveda Pass has plenty of engineering problems, including 15 million yards of roadway excavation in a single cut.

by Ray Day

BIGGEST. Toughest. These two superlatives crop up often, these days, among roadbuilders of Guy F. Atkinson Company. What they're referring to is a 12-mile section of the San Diego Freeway, between West Los Angeles and the upper end of San Fernando valley, which the South San Francisco based firm is building.

"Biggest" is accurate in two respects. First, the $17,224,700 contract price tag is the largest single freeway contract ever awarded in southern California. Second, the job will complete about 15 million cubic yards of excavation through a single cut. From this fact, you can draw some accurate conclusions about the rugged nature of the Santa Monica mountains, sliced through by the new freeway. It makes the word "toughest" mighty apropos.

It's a highball equipment show, as hundreds of men and machines slash through mountains so rugged that a quarter century ago, men could only dream of placing a massive concrete ribbon on such perfect alignment.

When it is finished, driving between the valley and West Los Angeles will be a breeze. Eight lanes of virtually straight, minimum-grade roadway, whose service bridges and overpasses call for 50,000 cubic yards of concrete and 6 million pounds of reinforcing steel, will allow motorists to skim over the hills without a single grade crossing.

Solves Bottleneck

Sepulveda Boulevard, for many years the main artery through the mountains, will be relegated to the status of a service road. And even its route will be altered substantially.

Atkinson's men and equipment will have to move 50,000 yards of dirt a day for 200 days to crowd an important segment of the 15 million-yd. dirt job to completion. Some 3½ million yards will have to be hauled from the big cut to the valley. About 2 million yards are waste. Another 5½ million yards are scraper dirt.

In one respect, the mountains are an asset. Proximity of an unlimited supply of earth fill for use on level portions of the freeway means that dirt won't have to be hauled in from distant sources. So, in spite of the enormity of the job, the spectacular dirt-haul show now under way really represents an economy for the engineers.

The project as a whole represents real teamwork between the California Division of Highways, the contractor, and the U. S. Army Corps of Engi-

neers. The latter agency is cooperating on a concurrent project with the construction of a 10 x 12-ft. storm drain. It will carry runoff water from old Sepulveda Boulevard and the new freeway. It will course underground from Mulholland Tunnel south, and hook up with an existing storm drain near Sunset Boulevard, in West Los Angeles.

In line with state specs, Mulholland Drive—just east of Mulholland Tunnel—has already been diverted a quarter mile south, to a new concrete bridge whose span towers 90 feet above the point where the freeway will eventually pass. A dangerous hairpin turn on Sepulveda Boulevard, immediately south of the tunnel and directly in the freeway's path, will be rubbed out completely.

Re-routing of Sepulveda has had priority status during the early part of the job, said H. B. Lew of the California Division of Highways. That's because four lanes of traffic must be maintained at all times on Sepulveda while work on the main freeway is in progress.

All in all, the picture of heavy construction and normal automobile traffic, so close together in the narrow mountain canyon, represents both a marvelous piece of traffic control, and a headache for Atkinson.

The man-sized earthmoving job, which will see the tremendous size cut finally finished, is the fourth contract in that vicinity. Dirt was removed from the cut first by Oberg Co., when the first portion of Ventura Freeway was built. Peter Kiewit Sons' Co. took more millions of yards out for the same freeway later on. A little more than a year ago, Atkinson had its first go with a tremendous, long-haul borrow for the Sawtelle Extension of San Diego Freeway.

Difficult Ripping

The job was bid with the expectation that modern rippers and high drawbar horsepower of tractors would handle the material, making the use of explosives generally unnecessary. But the cuts contain cemented and semi-solidified conglomerate in many spots, and even the dirt is tough and dense. The conglomerate particularly is highly abrasive, so much so that ripper teeth often wear out in half a shift. For this reason, it's been a ripper show from start, regardless of what method of excavation has been used.

Since much of the yardage in the big cut could be planned for downhill or gravity loading, modern belt loaders seemed highly suitable. They'd been used on some of the earlier contracts, always to good advantage.

For this reason, Atkinson brought in a Ko-Cal 6045-R 60-in. Roughloader, driven by a General Motors 6-110 diesel engine. Working with it is another Ko-Cal 4845-R, with a 48-in. conveyor belt. There are also three Kolman belt loaders on the proj-

TREMENDOUS MOUNTAIN of earth, taken out of the highway cut is pushed by this Euclid TC-12 toward the trap feeding a belt loader. *(Below)* It takes six dozers to keep this belt loader supplied.

MOVING DIRT into the waiting truck, this Ko-Cal Roughloader works at top speed. Operator's breathing apparatus is protected from dust by Jameson helmet; engine's breather is protected by Farr Roto-Pamic filter element in square box at right of photo.

ect—a 60-in. driven by a GM 6-110; a 48-in. driven by a GM 4-71 diesel, and a 36-in. model, driven by an International UD-221.

A hauling subcontract, between Atkinson and Asbury Transportation Co., provided for a tremendous fleet of over-the-road trucks to haul dirt from the five loaders. Asbury, one of southern California's biggest trucking companies, called for help on this one, renting additional units from Hess-Mace Trucking Co. At peak operation, about 70 International and Kenworth trucks, with Cook, Pasco and Fruehauf trailers, will be in use. Fully loaded, these trailers carry 26-ton net payloads, with 76,800-lb. gross weight.

One of the big problems in connection with long-range hauling of this type was the matter of getting loaded units across existing streets. Atkinson solved that one with the help of Bailey Bridge Rentals, of San Luis Obispo, Calif. Bridges were designed and erected to stand up under predicted load weights. When the job is finished, the bridges will go back into stock, to serve another job another day.

New products are in evidence on the loader-truck haul venture. Two of the trucks are equipped with Caterpillar's new 1643 diesel truck engine. Rated at 220 hp at optimum speed, the engines are giving a creditable account of themselves, according to Asbury's field manager. Chief advantage in addition to their power, he pointed out, is the absence of any excess noise.

Air-Conditioned Helmet

Down at the loaders, too, certain new things are being tried. The operator on the big Ko-Cal machine has a new air-conditioned helmet, developed recently by Jameson Industries. This device permits the operator to breathe dust-free air; and a separate battery-driven unit air-conditions the helmet on hot days. There's no question, say men who use the new equipment, that it makes their work more productive and efficient.

The biggest loaders are pouring material out at high speed, sometimes at rates of 1,000 yards an hour.

To get this output, it's necessary to shove dirt and rock into the feeder point of the loaders with multiple bulldozers. Six and seven large machines are being used around the biggest loaders; four or five around the smaller conveyors. Dozers range from the huge Shepherd Machinery U-type, mounted on D9's to blades almost as big on Euclid TC-12's.

At each of the loaders, extensive ripping is done in conjunction with dozer-feeding. Each of the dozers

has a Caterpillar, Ateco or Gar Wood ripper frame mounted on the back end of the machine. Sabre Tooth shanks are being used practically 100%, with Double J triangular breaker plates which give a wider and better pattern of breakage each pass. Points are either Esco and H&L No. 50 or No. 37, or a new type tooth made by Forg-Alloy. In all cases, the toughness and abrasion of material makes the job a proving ground for ripper equipment.

On shorter-haul work, where excavated dirt can be disposed of in reasonable distance, a scraper fleet is being used. Units include three Euclid 20-TD's, six Cat DW21's, six 42-SH machines with a capacity of 36 yards, and a pair of Hancock elevating scrapers towed by John Deere 840's. The latter do fine finish work.

The biggest scrapers are being pushloaded by two or three D9's, in the toughest material, after cuts have been extensively ripped. Loading is usually done downhill, often on very steep grades. The scraper fleet has been invaluable for following up behind the pioneer tractors, too, and getting cuts ready for the elevating belt loaders.

Disposal of material from scrapers is about the same as it is with the truck-hauling fleet. Atkinson assigned seven Kenworth, GMC and International water tank trucks of its own to the project, hauling from 3,000 to 5,000 gallons per trip. When this wasn't enough, it went outside the organization to rent additional units. Seven Cat No. 12's and two Caterpillar No. 14 motor graders are on hand to keep dirt leveled and haul roads polished.

Compaction to state specs is being handled adequately by several types of rollers. Essick and Vibro-Plus vibrating machines are on hand, so are six Caterpillar DW20-Hyster machines, a Buffalo-Springfield Kompactor, and a new Wagner segmented machine. After being used for some time, the latter roller was shifted to another Atkinson job on nearby Golden State Freeway.

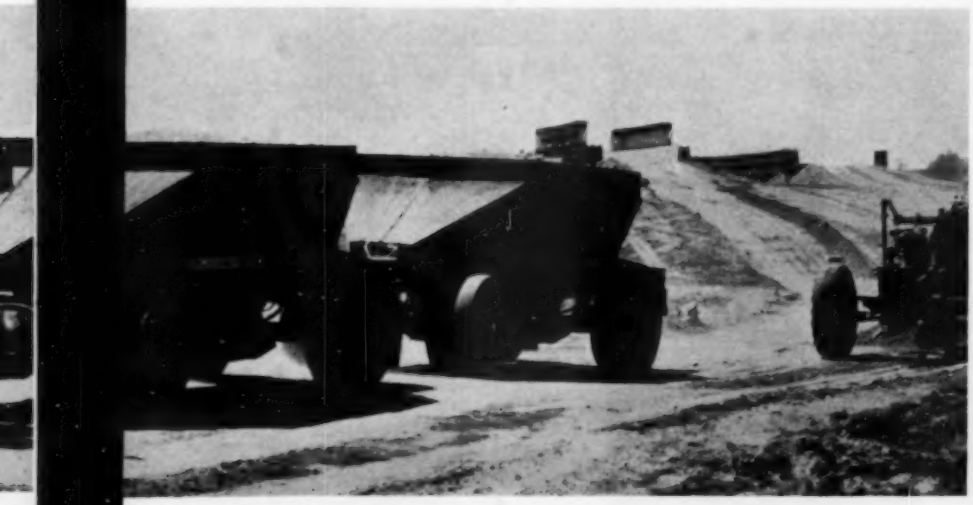
JAMESON HELMET worn by the operator of the Ko-Cal loader permits him to breathe dust-free air. A separate battery-driven unit air-conditions the helmet.

A rather unique system of forming is being used for the construction of the three-mile-long Corps of Engineers storm drain down the canyon. Designed by the Atkinson organization, it consists of three sets of three forms, reusable many times over. Rollers under each section permit the forms to move ahead quite easily, and screw packs make it easy to position the panels to exact grade and line.

First step in building the storm drain is to pour the invert, 11½ inches thick, together with a starter wall. The outside panels are then set flush against the outer face of the starter wall, and reinforcing-steel bars come in. The inner forms are then rolled into place, jacked so their upper fillets hit a precise grade. When the inner and outer forms are set, an 8-in. pouring space is left in the upper cross form. When concrete reaches that point, a sheet of heavy tin is used to close the space, and the upper deck is completed monolithically with the walls.

Forms are used in a 1-2-3 sequence. Three pours are blocked off for each set. On the first 50-ft. pour, a bulkhead is used at each end of the form. Pour No. 2, immediately ad-

HAULING SUBCONTRACTOR Asbury Transportation Co., has fleet of 70 trucks to haul dirt from belt loaders to fill areas. Cook Bros. bottom-dump trailers here carry 26-ton payloads.



HELICOPTER BUILDS FENCE

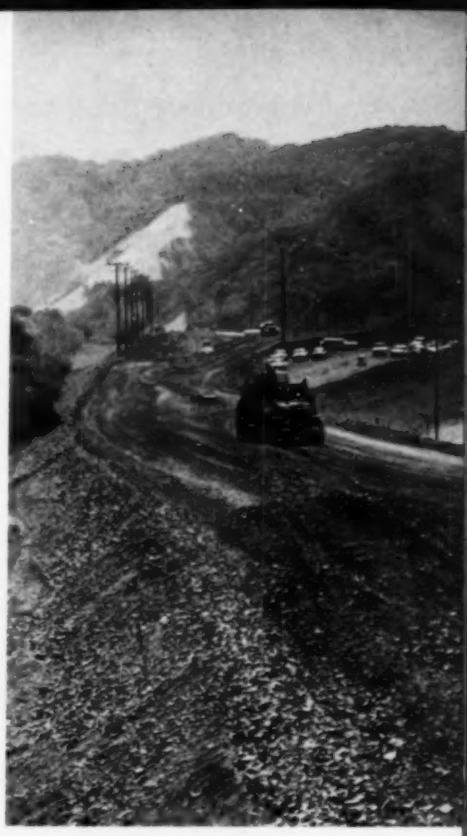
FLYING a fence to position may be unorthodox, but it was the most efficient way to do it on this job. Alcorn Fence Co. paid Comet Copters $84 an hour for the chopper, and speeded up the "impossible" fencing job enormously.

Since the freeway is a limited-access highway, all right-of-way boundary lines had to be fenced. That meant fencing slopes steeper than 1 on 1; crossing gullies, ridges; and mountain-goat climbing on steep hillsides. After digging the post holes by hand in many places where an International-mounted auger couldn't go, and pumping concrete 600 feet uphill with a special Thomsen concrete pump, Alcorn's men were ready to give up. That's when somebody asked, "Why not do it with a helicopter?"

The only problem—and it was solved by the helicopter service—was to rig a military bomb release so that (1) if things were going right, the roll of wire could be dropped by itself and (2) if something hung up, the whole works could be dropped, so the chopper wouldn't crash.

Three-Minute Trip

Working from a staging point up on Mulholland Drive, the helicopter delivered two 50-ft. rolls of fence wire at a time, making a round trip in only three minutes. The load was picked up after landing; dropped by triggering the bomb release on exact location while the whirlybird hovered. Two days with the chopper completed most of the delivery on 13,000 feet of fence.



jacent, has a bulkhead on only the leading end. Pour No. 3, the fill-in between the first two pours and leading concrete ahead, has no bulkheads at all. The forms are worked in teams of three. They're leapfrogged ahead as they complete three pours to make 150 feet of storm drain.

Over 90% availability of equipment has been achieved by a first-class maintenance program. Principal problems—how to get productive operation of a machine without abusing it; how to prevent mechanical wear; how to combat abrasion.

Taking things in inverse order, abrasion is one of the really bad headaches. There's no satisfactory pattern of hardfacing-rod selection, for example. A rod which works fine on one cut will crack, or abrade excessively on another. So far, Abrasoweld and Stoody 1027 have done about as well as anything.

For some years, Atkinson has used a dot system of maintenance on hardfacing. The dots of hardfacing metal, staggered to prevent long erosion runs, are put on by skipping around over the part to be hardfaced. That reduces heat stresses, and permits large areas to be hardfaced within economical limits of time, labor and material.

NOBLE BATCH plant will handle concrete weighing. It was being set up when this picture was made. Big cut area appears in the background.

Swing Shift Busy

Better mechanical wear is being achieved, too, partly in the selection and purchase of the latest equipment, and partly by placing field operation and maintenance in the hands of a veteran master mechanic who has a college-trained mechanical engineer on his staff. The mechanical engineer helps to design and lay out special jobs, takes care of the records on each individual piece of equipment, and helps to analyze downtime to minimize the unproductive hours.

Practically all heavy maintenance

STEEP MOUNTAINS of Sepulveda canyon show in this picture as scrapers move muck downhill on short hauls.

CONCRETE FORM for bridge column is erected by Bay City truck crane, while similar unit unloads lumber. Cranes also place the concrete.

whenever possible is done on the swing shift, leaving units available for production work during the daylight hours. Modern advancements have helped, too, in boosting availability. There is less valve and head trouble in engines now; less transmission and final-drive trouble. A pressure control device on DW20 and DW21 turbochargers has decreased field problems and reduced maintenance, says the master mechanic. Diaphragms are scheduled for 500-hour routine replacement still, however, as a safety measure. When a high-rotation turbo does need repair, it's taken to the main Atkinson shop or to Shepherd Machinery, in Los Angeles, to be reworked.

Fueling, also tremendously important to any production program, is discussed in a companion article.

The new freeway, slowly but surely, is beginning to take shape. By year's end, much of the grade will be finished. As time goes on, motorists will soon whiz through incredibly tough mountains, little realizing how much work has been done to gouge a freeway through such rough terrain.

ELEVATING TYPE Hancock scraper drawn by John Deere 840 rubber-tired tractor handles finegrade and cleanup scraper work. *(Below)* Semi-enclosed shop building has arched roof supported on each side by storage trailers.

CENTRAL TANK and pump farm, at mechanical shop headquarters, handles the main fueling and lubrication job for Atkinson.

Lube Setup Speeds Servicing

High speed techniques of servicing vehicles reduce downtime to minimum. Lube oil standardization also cuts down inventory.

by Ray Day

FUEL and oil, important to any construction job, are handled with particular efficiency by Guy F. Atkinson Company on the Sepulveda Pass Freeway. Loading service trucks, including the time to fill both diesel and gasoline tanks, has been reduced to less than 25 minutes. And the job has been standardized around only three lubricating oils. These are delivered in bulk lots, kept in tanks which are dirt free, and dispensed by high-speed electric pumps.

The Texas Company has the supply contract for fuel and lubricating oil. As a service to Atkinson, it set up its own new-style dispensing equipment. Two 8,500-gallon diesel-fuel supply tanks, at a central point, have 300-gpm electric-driven pumps which pour out diesel fuel and other lubricants in a flood. It takes a lot of fuel on this job, incidentally. A big Cat D9 tractor, working the way Atkinson pushes for production, will gulp 20 gallons an hour. At peak capacity the job will use about 5,000 gallons of diesel fuel a day.

Remote Storage

In addition to the two centrally located tanks, two spare diesel-fuel tanks of the same size were set at each end of the job. So, if a tank truck runs out of fuel close to either end, it doesn't have far to go to refuel.

Atkinson has standardized on Texaco's Series 3 Superduty oil, SAE-30, for all internal-combustion engines. Texaco Ursa SAE-10 has been selected for all hydraulic systems and air cleaners. Marfak Universal Gear Lube EP, SAE-90, is used for all general lubrication fittings. These oils are stored at the central headquarters point in dirt-free, rustproof tanks equipped with high-pressure pumps.

Portable service trucks carry 600 gallons of diesel fuel and 100 gallons of gas, battery water, solvent and the three types of oil. A separate special fuel truck carries 1,250 gallons at a trip. So few oils are used that the 11-reel service tank truck store the same oil in several compartments.

Swing Shift Busiest

The big lube push comes on the swing shift, when six grease monkeys and a service foreman load the two service trucks. These move each way from the central yard. Wherever possible, equipment is pulled off the line so that it can be served at the same time by both fuel and lube trucks. Daily service for a Cat D8 tractor can be cut to not more than 10 minutes.

The lube trucks, as a rule, fuel machines in faraway areas, put gas in light plants, and catch the more remote parts of the project. The bigger fuel truck concentrates on spreads of tractors and scrapers, which burn a lot of diesel fuel.

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All told, it's one of the best fueling and oil systems in use on the Pacific Coast at this time, and it's responsible for direct economy along that line. And by taking regular samples of engine oil, and having them analyzed by a petroleum lab, it appears as if the usable service life of engine oil can probably be increased to 175 hours under medium-severe conditions.

MOBILE LUBE and fuel units converge on big Cat scrapers; finish fueling and lubrication in a matter of minutes.

GREASE is clean and under high pressure, when it hits this fitting.

HOTEL SITE is in fashionable section of downtown Washington, D. C. Allis-Chalmers HD16 dozer blades loose dirt for removal by truck.

Underpinning Technique Speeds Excavation of Hotel Basement

Basement for new downtown hotel in Washington, D. C. is a tricky excavation job, but foundation specialist firm has the right answers.

by E. E. Halmos

AN unusual method of underpinning a 44-year old adjoining building, driving heavy foundation piling in uncertain ground against a considerable groundwater head, and handling considerable quantities of material in a tight space are special features, as contractors move in to build a $5 million hotel in downtown Washington, D. C.

The structure—to be called the Madison hotel—will provide 400 rooms, and more than 390 parking spaces on three basement levels, within its 186 by 124-ft. ground plan. It will be the second new downtown hostelry to be built in the city within two years, after a 20-year lapse in such construction in the national capital. The reinforced concrete building will have 13 floors and a penthouse.

Immediate problem for the three firms involved—a general contractor who is also owner, and his excavation and underpinning subs—was the character of the ground in the area (at 15th and M Streets, N. W.), and the manner of building most of the older structures in the area.

Low Bearing Value

The ground, like much of Washington in the low-lying downtown area, is a combination of old river bottom, long-forgotten fills, some glacial deposits, an ancient cypress swamp, with no firm rock within economical reach in many areas (60 feet or more below ground surface). Because much of the downtown area lies only a few

major city streets until structural walls against stub piles sunk in the founda- When the pipe-columns are jacked

HALFWAY DOWN into the eventual 40-ft. excavation, this 1¼-yd. shovel loads out some of the 50,000 yards of material that will create three-level basement and parking garage.

feet above tidewater in the placid Potomac river, groundwater is a constant problem—even at this point, about two miles from the river's bank. In addition, there are many underground streams—some of which are uncharted.

The soil itself is thus stratified, containing some sizeable water-washed boulders of various kinds of rock, considerable clay, and sandy deposits often with very few fines, because of the water action.

For this reason, many of the older buildings in the area were built on spread footings, without pile supports. That was the case with an abandoned hospital which originally stood on the hotel site, and with the existing Manchester inn, a residence hotel seven stories high, of brick bearing wall construction, which adjoins the site directly on the east. The old spread footings made it relatively easy for wreckers to clear the site of the old hospital—but it posed a problem in underpinning the Manchester inn, which stands at a distance of only a few feet from the new building line.

To handle this situation—and the general need to hold a 40-ft. deep excavation that abuts directly on two

UNDERPINNING adjoining building starts with digging trench 12 feet deep below bottom of footing. From trench, workers dig out space under footing itself for insertion of jacks to drive 12-in. diameter pipe into the earth.

JOB made well-point consists of series of 50-gallon oil drums welded together and holes punched in sides. The whole "point" is sunk into auger-drilled holes.

major city streets until structural walls are erected—the general contractor, Roscoe-Ajax, Inc. of Washington, called in the New York and Washington foundation and underpinning specialist firm of Coakley & Booth, under a $140,000 contract.

Here are the solutions worked out:

For the support of the main excavation (three sides) Coakley & Booth drove 12-in. BP53 H piles on 7-ft. 6-in. centers, completely around the two street sides (north and west) of the excavation, with a four pile return on the south and east ends.

As the excavation goes downward by another subcontractor—Hutchison Brothers of Washington, under an $80,000 contract—3 x 10 timber lagging is fastened to the face of the soldier piles, by a patented system of fastening called "contact sheeting." Three tiers of 14-in. BP73 steel walers will be placed, supported by 12-in. BP53 rakers of various lengths, butted against stub piles sunk in the foundation pile caps.

But for the rear side of the excavation, where the old Manchester butts, another system had to be worked out since the inn is an operating property.

Excavation Procedure

A pit is excavated 12 feet below the bottom of the roughly 3-ft. thick concrete continuous wall footing of the old structure.

Into this pit, workmen insert sections of 12¾-in. diameter $^{5}/_{16}$-in. wall thickness steel pipe. Portable 100-ton Elgood hydraulic jacks are then fitted on a collar over the top of the pipe section (jacking block), thrusting upward against the old footing, and downward against the pipe.

As the final stage of the pipe is jacked downward, wedges are inserted atop a steel beam section, inserted between the two jacks and acting on the block to maintain depth and pressure.

When the pipe-columns are jacked to firm bearing—about 40 feet into the ground—they are filled with concrete, and held under tension until the concrete is set—thus achieving a kind of prestressing. Jacks are then removed, and the deep pits are filled with concrete, to form an additional continuous beam below the old structure.

SPECIALISTS in foundations are Supt. W. B. Brown, Jr. (standing) and S. Thomas Fitz, district manager for Coakley & Booth.

With this support in place, excavation can proceed against the pipe-columns, which now act as soldier piles in addition to their primary function as supports for the old structure. Lagging and rakers will then be attached while excavation proceeds.

Excavation of the closely packed, but comparatively easily moved material, has been a relatively simple job for Hutchison Brothers, with the aid of only three principal machines in the tight maneuvering space.

Principal excavator is a Bucyrus-Erie 30-B crawler, with a 1¼-yd. shovel dipper. It is aided by an Allis-Chalmers HD16 dozer, and an Allis-Chalmers HD9 tractor-shovel equipped with a 1¼-yd. bucket, which doubles in brass both as a loader and to keep haul ramps in shape for trucks.

The only real trouble, according to Herbert King, superintendent for Hutchison, is a traffic problem—keep-

HARRY SCANLON, piledriving foreman for Coakley & Booth, foundation contractors, watches McKiernan-Terry 9B3 hammer drive 10-in. H-beams to act as soldier piles at sides of excavation. Piles are driven about 45 feet below surface.

LAGGING to form sheeting against soldier piles is installed by "contact sheeting" method, instead of more usual method of slipping timber inside flanges of soldier piles. A round clip assembly (in man's left hand) slips over flange of beam, is attached by bar in right hand (with pin connection to clip), to a reaction bar across the face of the 3 x 10-in. wood sheathing. In photo at right, reaction bars are in place on first tier of sheathing, fixed by wrench-tightened bolts.

ing haul trucks moving fast enough to keep the fast-moving shovel working fairly consistently. The site is on one of downtown Washington's busiest corners, and 15th Street is a principal artery for commuter traffic in almost transit-less Washington. When it is considered that some 50,000 cubic yards of material must be moved out, any contractor can spot the trouble with schedules and interference from heavy street traffic. A circular ramp within the site keeps Mack B62 haulers moving steadily.

One other problem is keeping ahead of groundwater. For this, the prime contractor has come up with a job-built innovation for the three deepwells now operating.

Out of a series of 50-gallon oil drums welded together end-to-end, he has built a large-size "wellpoint" by the simple expedient of punching holes in the sides of the drums (see photo on page 20). These casings are sunk to the average 50-ft. depth of the deepwells, and 2-in. Gould electric sump pumps inserted, to bring water to the surface for disposal through storm sewers.

So far, the deepwells and their "wellpoint" casings have successfully kept the excavation dry enough for operation. When completed, the excavation will be 40 feet below ground level at the west side, and about 45 feet below at the east and north, because of a slight rise in the terrain.

Because of the uplift from hydrostatic pressure, original plans call for the building itself to rest on heavy reinforced concrete pads that form almost a solid mat.

These pads will be 12 feet square and about 3 feet thick, placed roughly 19 feet on centers, then covered with an 8-in. thick waterproofed floor slab. Waterproofing will be continuous from the floor slab to the sidewalls of the three basement levels, up to ground level.

Principal columns, 24-in. x 24-in. average section, on 18 x 20-ft. centers, will be continuous from the footing mats through the full height of the structure.

Walter A. Courtney is general superintendent for the general contractor, Roscoe-Ajax. S. Thomas Fitz is district manager for Coakley & Booth, with W. B. Brown Jr. as superintendent on the job, and Harry Scanlon as piledriving foreman and Mel Brotherton as underpinning foreman.

The Madison hotel was designed by the architectural firm of Edwin Weihe & Associates with Heinzman and Clifton of Washington as structural engineers. Both are local firms.

HERBERT KING, superintendent for excavation contractor, Hutchison Brothers, poses in front of several tiers of sheathing set in place.

OUTPUT of the Marquesado mine is shipped 60 miles by rail to the port city of Almeria. Old stone arch viaduct carries trains to dock and storage area.

ROCK DUST spurts up as Joy Challenger T500 puts down blast hole. Blasting averages 13,000 tons per 8-hour shift.

More Iron

The nation's largest ore producing district in southern province of Granada greatly increases output in three years. A nine-shovel spread is at work full-time.

SPAIN is making an all-out effort to improve her economic status and the standard of living of her people. Hydroelectric and steam generating plants, great irrigation systems and new highways all contribute to this objective. So does the steady increase in iron and steel production.

In 1930 this peninsular nation mined 6½ million tons of iron ore. Then came world depression, Spain's long and devastating civil war and World War II. Not until the 1950's did Spanish iron mines begin to come into their own again. In 1959, 4,655,241 tons were mined. Last year the estimated iron ore output reached the 6 million figure.

The country's largest producer, the Marquesado mine owned by Cia. Andaluza de Minas, S.A., has increased its output from 360,000 tons in 1957 to 504,000 tons in 1959 and an approximate 550,000 tons in 1960.

Located on the edge of a vast alluvial plateau—*Cenete de Marquesado*—about 3,763 feet above sea level in the southern province of Granada, the mine is 62 miles from the big railway port of Almeria and the same distance from the inland city of Granada. Ore is shipped via RENFE, the government railway system. All of it goes to Almeria, roughly two-thirds of the production for export, and the remaining one-third to Ensidesa in Aviles, the new steel plant in northern Spain.

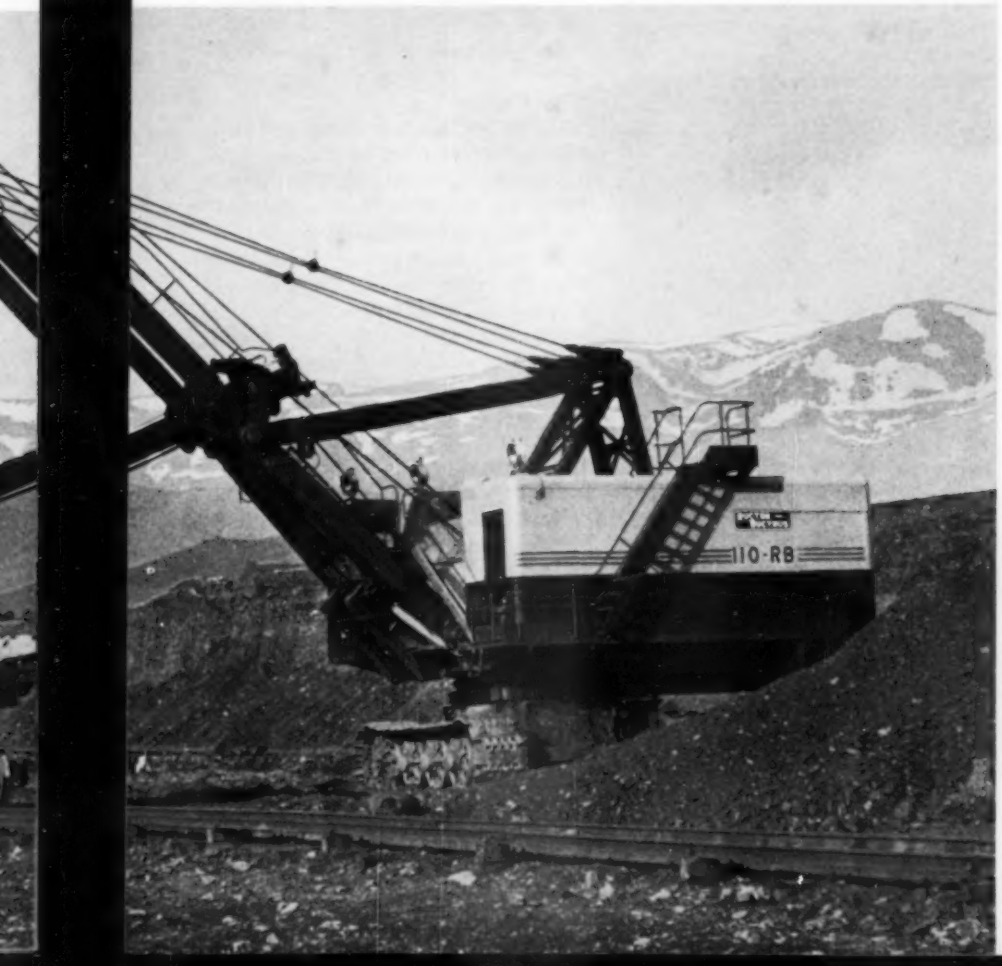
Adjoining this mine to the south is Minas Alquife where ore is exposed on a low hill. (All Marquesado ore is below the surface.) Previous to the present ownership, the Bairds Mining Co., Ltd. had done extensive work including three shafts below water level and about 19 miles of lateral explorations.

After painstaking study, the new owners initiated a combination of open pit and underground develop-

ORE is fed by rear-dump to hopper which in turn feeds 29-ft. long underground conveyor. Preventive maintenance program has lowered urgent repair jobs on all trucks and machinery at least 25%.

for Spain

by Mary Saint Albans



LARGEST SHOVEL in Spain swings 4½-yd. dipper of material into 25-ton Woodford car. Dipper teeth must be changed weekly because of abrasive overburden.

ment. Despite long years of frustrating national and international complications, the company has already mined over 4 million tons of ore. Reserves are calculated at a minimum of 21 million tons with approximately half located below the water level.

The ore body is covered with a deep deposit of alluvium and a thin layer of limestone. The amount of excavation in bench operations, past and future, is estimated at 15,700,000 cubic yards of alluvium; 3,715,000 cubic yards of limestone; and 10,800,000 tons of iron ore.

This formidable excavating program can be better appreciated by surveying a company chart which divides it into six phases. The first phase which began in 1932 shows 6,820,000 cubic yards of alluvium dug and 392,400 cubic yards of limestone. No ore was produced.

In the second phase, 1,800,000 tons of ore were shipped. This amount

entailed the excavation of 601,680 cubic yards of limestone which had to be dug away from the deposits. In this phase too, 4,839,600 cubic yards of alluvium along with 483,960 cubic yards of limestone were dug.

Next came the third phase, now being completed, with 2,750,000 tons of iron ore and its concomitant 915,600 cubic yards of adjacent limestone. Along with this were uncovered 3,322,320 cubic yards of alluvium and 654,000 cubic yards of limestone to make the second enlargement.

In the fourth phase, this second enlargement will be exploited to produce 2,750,000 tons of iron which necessitates the removal of 915,600 cubic yards of limestone. At the same time, to make the third enlargement 5,035,800 cubic yards of alluvium will be uncovered along with 13,080 cubic yards of limestone.

From the third enlargement the fifth phase will produce 1,900,000 tons of ore along with 196,200 cubic yards of limestone to be excavated. Also, to make the fourth enlargement 7,285,560 cubic yards of alluvium will be dug.

From the exploitation of this enlargement the fifth phase will produce 1,600,000 tons of iron ore with its removal of 65,400 cubic yards of limestone.

It was an unseasonably cold morning when this reporter viewed the gigantic oval gash in the ground which, including future enlargements, will measure 2,625 x 1,640 x 492 feet deep. A mile away the perpetual snows of the Sierra Nevada mountains make a dramatic backdrop.

A wide gravel road slices through the 33-ft. deep benches to descend spiral fashion on an 8% grade. Euclids roar by heaped with limestone destined for waste dumps above. Half hidden in swirls of ore and overburden dust are shovels biting into mounds or low walls of material and loading long lines of trucks.

Nine-Shovel Spread

The entire excavation program so far has been accomplished by seven shovels. Two additional ⅜-yd. Ruston-Bucyrus 10-RB shovels do auxiliary work, making a total of nine.

The shovels in the pit include two 2½-yd. Bucyrus-Erie 75-B electric machines. Although nearly 30 years old, the two shovels are responsible for the excavation of over 10 million tons of material and are still going strong. The other shovels are Ruston-Bucyrus machines, manufactured in England. They are: two electric 54-RB's with 2½-yd. dippers; two 1½-yd. electric 38-RB models; one new 4½-yd. 110-RB and the two ⅜-yd. 10-RB shovels. The largest shovels handle the overburden; the 38-RB's, the mineral ore.

ON THE JOB for 29 years, this 2½-yd. 75-B electric and a twin shovel have dug over 10 million tons of overburden. Mine operates a fleet of 16 Euclids.

The new 110-RB electric, the largest shovel in Spain, strips overburden. It is working on the fourth pit enlargement, a job which engineers say may take seven to eight years to complete.

The alluvium is so abrasive that dipper teeth must be changed every week.

In the pit, Euclids dump ore into a hopper which feeds an enclosed 29-ft. long conveyor to serve 2-yd. skips. These are pulled 295 feet to the surface over a 45° concrete apron. This skip system also handles the pit alluvium. Designed and built in the local shops, it has a 180-tph capacity.

Reaching the surface, the skips dump into loading bins which empty into 25-ton Woodford cars. This English Woodford system, operated by remote control, was installed in 1931. The electric-powered cars run on tracks with a maximum grade of 6%.

The cars convey the ore to the screening and sizing plant which has an 1,800-tph capacity. The alluvium which is brought up by the skips goes to a waste dump. These dumps contain about 15 million cubic yards of alluvium and 2,616,000 cubic yards of limestone.

Fortunately, the alluvium needs no blasting as does the limestone and iron ore. For the blasting, a Joy Challenger T500 drill coupled with a

SKIP OVERTURNS into hopper and Woodford car below. Woodford system was installed in 1931.

mobile Joy 600 compressor is on the job. Two medium-weight Joy wagon drills do the horizontal drilling and jack hammers prepare for secondary blasting. Explosive is Trinolite No. 1, 80% ammonium nitrate and 20% nitroglycerine.

Limestone Difficult

The clearing away of the final layer of limestone and/or alluvium from the ore, is sometimes difficult and much must be done by hand. However, a Continental tractor shovel is also used and, at times, a Cat D8 or D7 dozer complete the job. The two Cats also do cleanup work around the shovels. Other equipment includes 16 Euclids. A UMOG truck brings explosives to the job as well as water, gasoline or diesel motors and spare parts.

Of the 850 men employed by the company, one-fourth work in the underground mine which produces about a quarter of the ore. Sublevel block caving is used in hard ore sections, cut-and-fill methods in the medium soft sections. The ore is broken down with push drills. Hudson Hunslet locomotives take ore from loading chutes to shaft stations and Woodford cars on the surface deliver it to the screening and sizing plants.

The main difficulty encountered underground is water. At the water level, altitude 3,412 feet, is an underground lake which makes operations very costly. After extensive study, engineers agreed on a 2-mile tunnel which will reduce the pump head from 459 to 151 feet. Construction will begin early this year.

A second problem is electric power. There are three sources, not entirely satisfactory. Seven miles from the mine, hydroelectric plants utilize two waterfalls from mountain snows which are 328 feet and 820 feet high. For five months of the year when the snows melt rapidly, these falls furnish from 400 to 600 kw. The remaining months the figure drops from 150 to 350 kw. Both plants use Pelton turbines and the Thury system. There is also a three-unit diesel power plant with a maximum output of 100 kw. The third supply is a public utility, *El Chorro,* of variable dependability.

The mine, a night or day's travel by train or car from Madrid, is located in a region devoid of industry. Hence, there are no machine shops or trained mechanics. As intricate and costly machinery has been purchased in far-off countries, sometimes the company has had to wait two years for an ordered part to arrive. Consequently the executives have worked out a meticulous preventive and repair program.

The best technical men obtainable have been brought from Madrid not only to work on machinery, but to teach apprentices recruited in the region. Much attention is focused on prevention tactics which have lowered urgent repair jobs at least 25%.

Every year shovels are taken off duty for an entire month in order to receive a complete overhaul. Engineers who point to the excellent records of the 75-B shovels say this plan pays off handsomely.

Machines Tagged

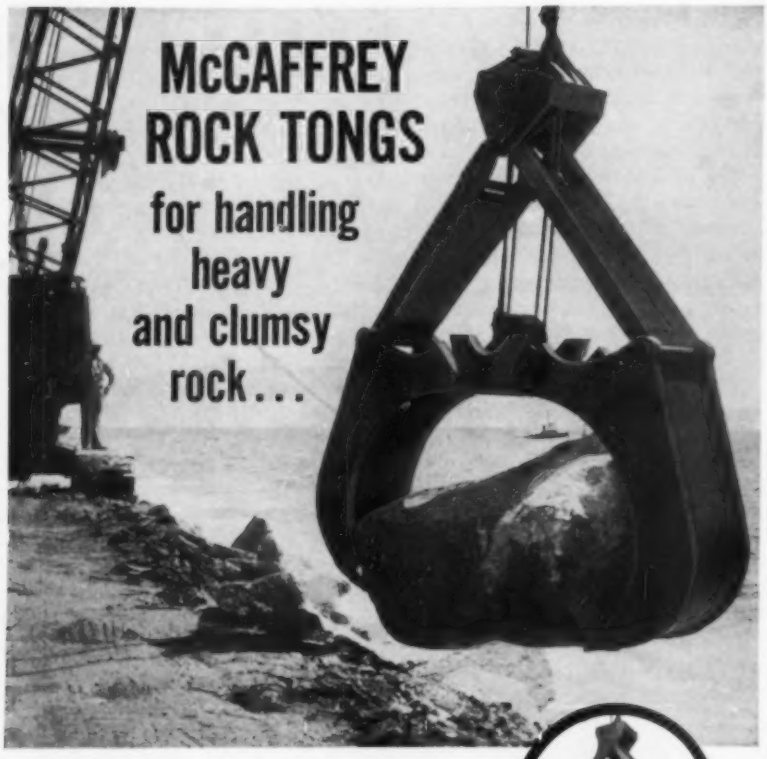
Trucks, bulldozers, jeeps, motorcars and other machines carry plates indicating the type of attention demanded at certain intervals, namely—20 hours, 100 hours, 500 hours and 5,000 hours. At the end of 5,000 hours, the vehicle is given a thorough overhaul. The motor is removed and sent to a special repair department. After the body of the machine is in perfect order, a second motor is installed so that the out-of-duty time can be shortened.

The various large shops are equipped with the most efficient machines obtainable. Cost is no factor. There are mechanical repair departments, electric repair departments, sawmills and carpenter shops.

The neighboring country is agricultural but very low in production, and farmers are glad to earn extra money working five or six hours a day and using the remaining daylight hours for farm labors. This has built up a reliable and steady labor supply.

Much of the year the weather is tough to live with. There is little rain—in fact, the region is semi-desert. For long periods the heat reaches 105°, and then drops to about 15°

LARGE CHUNKS of limestone are hand drilled in preparation for blasting.



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DEEP IN PIT, Cat D8 *(above)* dozes final layer of limestone from the ore deposit. *(Below)* Hoist hauls 2-yd. ore skip up a 295-ft. track to loading bins.

during the cold months. Sharp biting winds intensify the cold. At times snow comes in the winter but average shutdowns for this reason are only four or five days.

However, because of the inclement climate and the region's isolation, the Cia. Andaluza de Minas goes all out to make living conditions as pleasant as possible. There are about one hundred houses occupied by engineers, foremen, technical men and the like, in fact, for all employees who did not originally live in the neighborhood. There is an ultra modern hospital, school, pleasant offices and a large director's building which serves for visiting officials and guests. All this is enclosed in a park bright with flowers and gracious with poplar groves and pine-bordered walks.

In Almeria, the export port where the climate is more agreeable, 50 men work under the direction of Senor Edgard Bizet. Here dock installations are extensive and efficient. A pier runs far into the water and storage facilities add up to 70,000 tons. Ore can be loaded at the rate of 800 tph into 8,000-ton ships.

An interesting viaduct, over which trains run for three blocks or more, ascends to cross streets and empty into storage rooms below.

At the mine, Senor Don Michael De Carpentier is general superintendent and Senor Don Georges Rozier, Assessor General. In Madrid, main offices at Antonio Maura 10 are about two blocks from the Ritz Hotel, three blocks from the famous Prado Museum. Here the secretary general, Senor Don Luis Lamana de Hoyos and the Consejero Delegado, Don Luis Lamana Lizarbe, are in charge.

Asbury Fights Tides, Rain to Move 11,500 Yards Daily

Borrow pit for highway job is so close to the Pacific Ocean that it will eventually become part of a small boat marina.

FIGHTING water every inch of the way—rain, water tables, even high tides—Asbury Contractors, Inc., of Los Angeles, is moving approximately 11,500 yards per day over an average 2.4-mile haul with a spread of 11 scrapers, two power shift crawlers and a motor grader.

Working under subcontract to Griffith Co. of Los Angeles on an $8.2 million highway project, Asbury is supplying 1.9 million yards of borrow for the six-lane, 4.6-mile long Ventura (Calif.) bypass.

Asbury is working out of a 75-acre pit which is only a stone's throw from the Pacific Ocean. It is, in fact, so close that the borrow pit will eventually be used as part of a small craft harbor. Project Superintendent Robert R. Jones first began encountering water four feet below natural grade. It has been a battle ever since. But that wasn't all that Jones was to encounter. Last fall heavy rains shut down the job for five weeks when the material became too wet for proper compaction. High tides hit early this year. Licking at the eastern boundary line of the pit near the mouth of the Santa Clara river, the rising tide eventually tore through a 600-ft. section.

Pit Submerged

When it was over, 45 acres of the pit lay under water, as much as 20 feet deep in spots. Under terms of the contract, all dewatering was to be handled by the prime contractor. Dozens of submersible pumps, from 6 to 16-in. diameter, were put to work dewatering the pit, pumping out 12 million gallons every 24 hours.

When the scrapers were able to go back to work, Jones concentrated the fleet at the inland end of the pit, leaving a dike approximately midway as

ROBERT JONES, project superintendent for Asbury Contractors, has a dirtmoving outfit that's really hot. Records show each scraper of an 11-unit spread averages 45 loads per 9-hour day.

PUSHLOADED by tandem D8H tractors, Cat DW20G-456 tractor-scraper scoops up heaping load in 30 to 45 seconds.

protection against further tides. Meanwhile, the pumping operation continued at the western (or oceanside) end of the borrow area.

Despite these natural and unnatural adversities Jones has been getting above average production. Cross sections taken by state highway engineers reveal that he is moving an average of 23 bank yards per machine. Contributing to this production have been good haul roads, tandem pushing, and putting into practice the geometric axiom that a straight line is the shortest distance between two points.

Asbury's spread of 11 Caterpillar scrapers includes two DW21 Series G tractors with 470 Series B scrapers, and nine DW20G's, four with 456B standard scrapers, two extended and sideboarded scrapers and three 482B scrapers. The units replaced 30 bottom-dump trucks releasing them for duties elsewhere. For pushloading, Jones is using two powershift D8H tractors, and for maintaining the haul road, one No. 12 motor grader.

Haul length ranges from 1.3 to 3.5 miles. Because of the wet material, however, scrapers must haul to a different section of the fill daily (sometimes hourly) to give the material time to dry out. Jones' daily production records reveal that each scraper averages 45 loads per 9-hour day, but have hit peaks of 50 loads. In general, the DW21's are used on the shorter hauls and DW20's on the longer. Four of the DW20's have been equipped with Athey Tractionaiders. This traction assisting device transfers front and rear axle weight to the center axle at the touch of a lever, increasing traction in soft material and on steep grades. Asbury's Tractionaiders are one of the first to be used in southern California.

When the units first went on the job they were overhead-loaded by two Manitowoc 3900B draglines with 5-yd. buckets because of the muddy nature of the material. However, when more solid earth was reached, Jones switched to pushloading.

Because the scrapers are hauling to various lengths, the job of keeping them operating at maximum efficiency in the borrow pit is a ticklish one. However, Job Superintendent Alfred Oberhoff, with an uncanny sense of timing, manages to prevent the 11 scrapers from dawdling in the pit.

Gulp Heaped Loads

The borrow area contains a preponderance of adverse material, including mud, clay, soft sand and silt. Yet, pushloaded by the tandem dozers, the scrapers gulped heaping loads in 30 to 45 seconds. The 235-hp D8H dozers were able to pushload and doze in second gear at speeds up to 4.4 mph.

This is not a beach. It's a portion of the borrow pit, a stone's throw from the Pacific ocean. Scrapers in the background are working a higher, dewatering section of the pit.

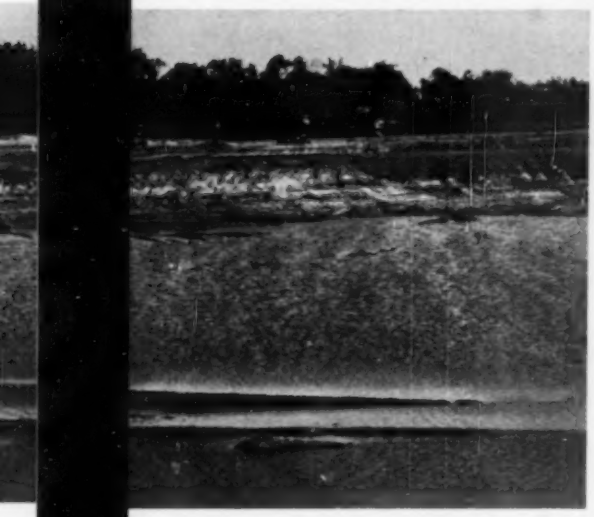
DOZER PULLS 30-ft. John Deere tandem disc-harrow on the fill to stimulate drying. Spreading and compaction is being handled by Griffith Co., the prime contractor.

Jones pointed out that it was seldom necessary to go down to first gear with these machines. The tractors were equipped with combination push plate-dozers, so they could blade the cut between loading cycles.

Both the dozer blades and rear C-frames were mounted on the track roller frame. Thus the force applied by the second pusher was transmitted directly through the roller frame of the first pusher. This arrangement avoided placing undue stress on final drive assemblies.

Keeping a 12-mile network of haul roads smooth and well-stabilized were the No. 12 motor grader and a 3,500-gallon water truck. As a result, the highspeed DW20's were able to roll along at up to 30 mph loaded, 40 mph empty. Average cycle time, including loading and dumping, was 15 minutes.

SPARE TIME job for the dozer-equipped D8's is blading the borrow pit. The 235-hp power shift tractors operate in second gear while dozing and pushloading.

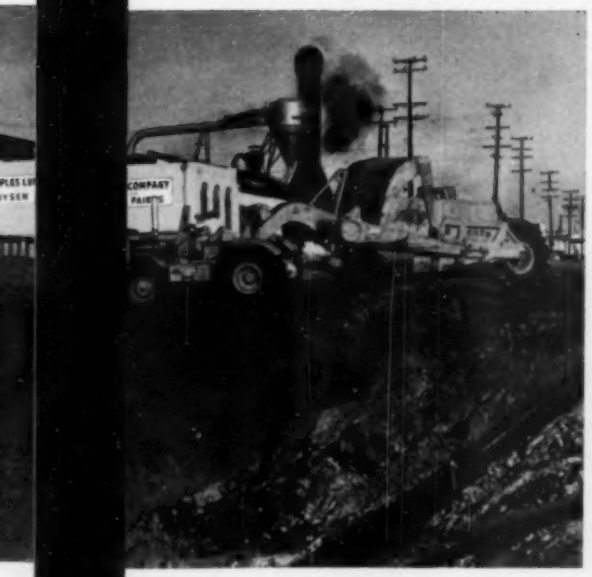


Jones production of 45 to 50 loads per machine would have been far less had he not decided to go through an obstacle, rather than around it. The obstacle was a lemon grove, which separated the borrow pit from a section of the new roadway. Going around the grove meant traveling 2½ miles; going through it was less than a mile.

Jones chose the latter course, eliminating better than 3 miles haul and return distance, which was considered well worth the cost of temporary right-of-way and time spent building the road.

When the job was visited recently, Asbury had moved 1½ million yards of material. The balance was scheduled to be completed by June.

Although the specifications call for providing 2 million yards of material in place, Jones actually will have to deliver an estimated 2,113,000 yards. Not only is the material swollen by moisture, but the dewatering process creates voids. Griffith is handling compaction at the fill. Roadway excavation was subcontracted to Crowell & Larson of Los Angeles.



ROADWAY excavation from which unsuitable material has been removed gets a load of fill from this DW20-482 tractor scraper. The dozer will push it into the hole.

In the heavy construction field, Asbury has two Class A general contractor's licenses and operates a 56-acre borrow pit in the greater Los Angeles area for use in raising Terminal Island. A sister firm, Asbury Transportation Co., operates a common carrier service. Its fleet of some 480 trucks of various kinds operates in California, Oregon, Washington, Idaho, Nevada, Colorado, Wyoming, Nebraska, Kansas, Iowa, Oklahoma and South Dakota. Asbury specializes in transporting oil field, pipeline and heavy construction equipment, as well as general commodities. It is the first carrier certificated by the ICC for transporting cyrogenic liquids and exotic fuels to missile sites in the aforementioned areas.

Heading the Asbury system is A. J. Eyraud, president of all the corporations involved. Eyraud is also chairman of the Los Angeles Metropolitan Transit Authority, a state agency regulating transit systems in Los Angeles county. Robert D. Flaherty is Asbury general manager.

TORQUE CONVERTERS—

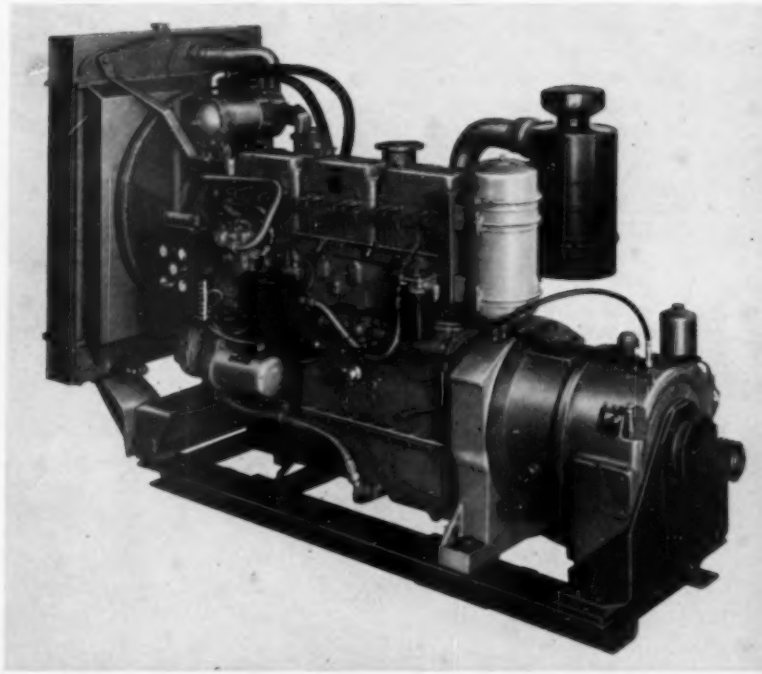
'better' or only 'different'?

by

G. W. Upp

Industry Manager,
Twin Disc Clutch Co.,
Racine, Wis.

Less than 20 years have passed since the first hydraulic torque converter was installed on a crane. Today one out of every three crane-excavators purchased is equipped with torque converter drive.



CUMMINS DIESEL HR6-IP engine, ready for mounting on a 30-B excavator, has a single-stage Twin Disc Series 1500 torque converter.

HIGHWAY GRADING through a rock cut is tough on a shovel's deck machinery, but this model L-85 takes the heavy shock loads in stride thanks to its torque converter drive.

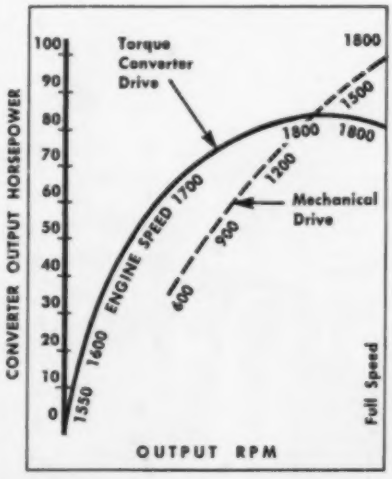
CABLE LIFE on a torque converter equipped unit, like this 1¼-yd. 30-B hoe, can be double that on a direct-drive machine.

WHEN you buy an engine, you're actually buying "horsepower." To deliver the horsepower you paid for, the engine has to operate at or near its governed speed. Every time the engine slows down under load, it's money out of your pocket, because you're being robbed of horsepower.

In excavating, particularly in hoe and shovel digging, the operator works more or less "by ear," depending on engine noise to find the best bite. This requires careful crowd control to keep from killing the engine. The deeper the bite, the more the engine lugs.

Keeping this fact in mind, let's take a look at the shovel operation using straight mechanical drive. As the dipper bites in, the load reduces machinery rpm and the engine slows down or may even stall. So the operator moves his crowd control trying to find a better bite that will let the engine regain its governed speed. By now, input torque may have already dropped along with engine speed. So again the engine lugs as it shoulders the new load—setting up shocks and vibrations throughout the drive train, as well as giving the operator a "workout" which may be repeated hundreds of times a day. From a dollars-and-cents point of view, it's plain inefficient.

Now let's take the same job and put a torque converter behind the engine. As before, when the cut gets deep, the dipper will slow down, but the engine remains at high speed. The dipper becomes filled in a shorter distance and faster because it uses the horsepower advantage gained from an engine running at near constant speed, delivering more horsepower—through the converter unit—to the deck machinery.



COMPARISON CHART shows how a converter keeps engine rpm high, regardless of load, so that almost constant power is delivered to deck machinery. Note that, with mechanical drive, engine speed is reduced in direct proportion to dipper speed.

It's all done automatically by the torque converter's unique ability to increase engine torque output in the exact ratio demanded by the load. By eliminating engine lugging, the converter gets more work done faster.

"Force without motion" is another advantage of torque converter drive. In crane erection work, the converter permits gentle handling and accurate positioning of heavy loads through use of the engine throttle alone. With engine idling on a crane, the hoist clutch can be engaged. The throttle is then slowly opened to start the load smoothly upward without boom sway. Lifting speed is steadily increased until the load is near its destined height, at which time the throttle is gradually closed to stop the load and hold it stationary. This is a valuable

Since shovel and crane loads are

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We're making solid gains in the fight against cancer, in the research laboratory, in the hospital and in the home. Ten years ago medical knowledge was able to save only 1 in 4 lives — today it's saving 1 in 3.

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AMERICAN CANCER SOCIETY

asset on such jobs as setting steel girders and concrete beams or heavy machinery. It assures soft starts, fast lifts, gentle stops and no dangerous jerking or swaying.

Where Did the "Snap" Go?

Ever hear an operator complain that a converter-equipped machine lacked "snap?" He's right as rain, but it's no cause for complaint. The snap he's accustomed to is the impact caused by quick drum speed change, a common occurrence with mechanical drive. Any sudden load increase imposes terrific shocks on the power train as moving parts are caught in an unyielding steel-clad grip. The resulting stress may be ten times that of normal operation. Most machinery downtime can be traced directly to these shock loads.

Experience has shown that smooth converter power reduces peak loads throughout the drive train because part of the "shock power" is dissipated in fluid "slip" rather than in clutch linings. Clutches can be engaged more quickly because the converter absorbs the energy that would otherwise produce clutch "jerk." Not only is clutch life extended, but shovel operating cycles can be speeded up 10 to 20%.

In a torque converter there's no metal-to-metal connection between driving and driven equipment. The hydraulic fluid has the magic power to soak up shocks and jolts . . . they cannot pass through the converter, either from engine to deck machinery or vice versa. Cable life is doubled and often tripled as a result of this smooth output power.

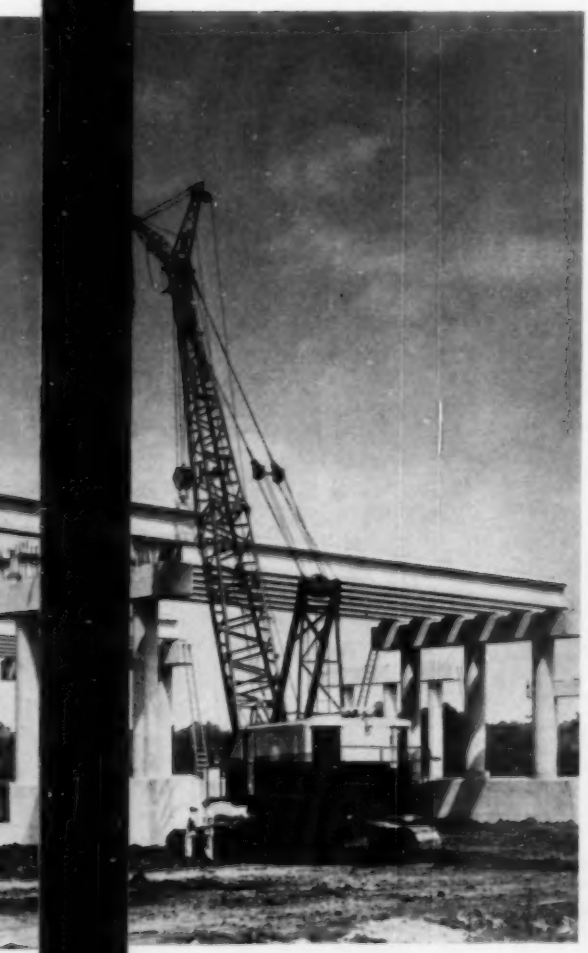
CONCRETE BEAMS can be softly lifted "on the throttle" and held in mid-air with little or no swaying by converter-equipped cranes. This ability to inch and hold under power makes for safety and accuracy in spotting.

Since shovel and crane loads are highly variable, almost all torque converters on these machines are equipped with an output shaft governor. This device keeps the output shaft speed fairly constant, but reduces engine rpm when the load does not require maximum engine power as in swinging and dumping. The output shaft governor cuts fuel consumption and engine wear while maintaining desired machinery speed.

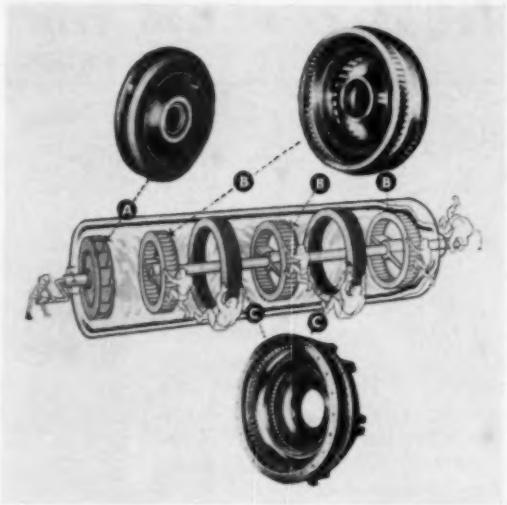
Profit Is the Pay-off

Torque converters pay off across the board. They increase machine average power loading as well as work output per hour. They eliminate the shock loads that lead to high maintenance costs. And they're a real time and equipment saver in training new operators.

If you're planning to purchase a new machine or repower an old one, torque converter drive guarantees a bigger return on your investment.



HOW A TORQUE CONVERTER WORKS



OPERATION of a torque converter is based on a fundamental principle of physics —the principle of leverage. Every schoolboy knows it's a lot easier to move a boulder with a long plank than with a short one. In engineering terms, the longer the lever, the greater the mechanical advantage.

Torque is leverage applied *around* a shaft. When you add a cheater pipe to a wrench in order to tighten a nut, you are increasing the torque or twisting force. The same thing occurs in a mechanical transmission when you shift from high to a lower gear. Small gears turn large ones at slower speeds, and, as the speed decreases, torque increases. Obviously the amount of torque available in such a drive is limited by the size of the largest gear.

A torque converter applies the leverage principle in an entirely different manner. There are no gears and no connection between input and output shafts; instead, fluid is used as the actuating medium. The converter has three basic parts as shown in the above diagram.* The *impeller* (A), connected directly or through a clutch to the engine flywheel, works like a centrifugal pump; it has a ring of metal blades which turn in the fluid. The *turbine* (B), made up of three rings of blades, is direct-connected to the load. The stator (C) is a part of the housing and contains two stationary sets of blades.

As the engine turns the impeller, fluid is forced outward by the pump blades, striking the first ring of turbine blades and thereby setting the turbine in motion. Blades on the first stator re-direct the fluid against the second set of turbine blades. In this way the fluid flows through all three sets of turbine blades.

Under normal load conditions, the turbine turns almost freely and fluid passes through the converter readily, striking each blade at a very slight angle. But when a load is encountered, the turbine slows down since it is direct-connected to the load shaft. Fluid then strikes the turbine blades at a sharper angle. As the force of the fluid is relayed from the first to the second to the third ring of blades, output torque accumulates until it exceeds input torque as much as six times.

The twisting force generated as fluid glances from one turbine blade to another is the output torque of the converter. The sharper the angle of fluid to blades, the greater the torque. By redirecting the flow of oil so that all its potential force is utilized, the converter increases torque as the load increases. Thus the converter does automatically what must be done manually in a mechanical drive.

* This is a description of a Twin Disc three-stage converter which multiplies torque up to 6:1. The single-stage unit has only one set of turbine blades and one set of stator blades, and is used where a lesser degree of torque multiplication (up to 3:1) is needed.

NEWS FROM THE FIELD

Preboring for Piles Eliminates Piledriving On Storm Sewer Job

Intercounty Construction Co., Hyattsville, Md., is putting in 1,400 feet of 11-ft. diameter concrete storm sewer under Benning Road in Washington, D. C. The pipe is laid in a monolithic pour 22 feet below grade. Problems in excavation involve maintaining traffic on busy Benning Road, digging around a number of utility crossings, keeping road and property damage to a minimum, and shoring up the deep, wide trench enough to allow pouring the concrete and to provide for the safety of the workers.

A hoe and clamshell are used to open up the ditch, the latter especially when underground utility connections get in the way.

Intercounty Construction figured out a way to put in the shoring without resorting to pile driving and its attendant noise, heavy equipment, and allowance for working space. The firm uses a preboring method which consists of dropping H-beam piles into holes augered out by a Ka-Mo A-295 earth boring machine.

After breaking through the concrete road surfacing, the company moves in a truck crane with the 18-hp Ka-Mo unit mounted on the boom. This unit bores a 16-in. diameter hole down anywhere from 20 to 28 feet on both sides of the ditch to be opened, spaced at regular intervals along the way.

The H-beams are dropped into the holes and as excavation progresses downward, wood shoring is dropped lengthwise along the excavation in between the slots formed by the series of H-beams. Bracing is inserted crosswise as the ditch is deepened.

The firm's preboring method results in these advantages over driving pile: much less noise, lower investment in machinery, fewer delays because of less moves and ability to work in tight quarters, less property damage, and faster placement of H-beams in the ground.

PLACEMENT of H-beam piles without pile driving is done on Washington, D. C. sewer job by preboring 16-in. diameter holes with 18-hp Ka-Mo earth auger, then dropping beams into holes.

ARTIST'S CONCEPTION of 90-yd. Bucyrus-Erie 1850-B stripping shovel being built for Pittsburg-Midway Coal Mining Co. Dipper will take out 150 tons of material with each swing.

90-Yd. Stripping Shovel Ordered by Pittsburg-Midway

Sale of a large, new, electrically-driven, revolving shovel has been announced by Bucyrus-Erie Co., South Milwaukee, Wis. Scheduled for delivery next year to Pittsburg-Midway Coal Mining Co., Pittsburg, Kan., the huge 90-yd. (dipper capacity) 1850-B excavator is another machine in a new line of stripping shovels the company has developed.

When fully erected in southeast Kansas, the giant excavator will weigh over 8 million pounds—the equivalent of about 32 diesel locomotive units—and stand more than 150 feet in the air—higher than a 15-story building. The machine's electric power plant, totaling 9,000 hp, will enable it to dig out 150 tons of overburden, which covers deeply buried coal seams, swing and deposit it more than 300 feet away in less than a minute's time.

The Kansas coal mining

firm already owns several Bucyrus-Erie units, including three walking draglines, two with 20-yd. buckets and one with a 5-yd. bucket.

Hudson Valley Predicted Cement and Concrete Leader

New uses for formerly worthless rock coupled with geologic findings in the Hudson Valley during the past three years should make that area the leader in cement and concrete aggregate production for a century or more.

Dr. James R. Dunn, associate professor of geology at Rensselaer Polytechnic Institute, speaking at a recent meeting of the Ravena (N. Y.) Rotary Club, also said that impure limestones have been found valuable as coarse aggregate and shale as expandable aggregate.

"Formerly this limestone and shale had to be stripped from cement rock at prohibitive costs," Dunn said. "The effect of the findings has been to multiply, from 3 to 10 times, the potential reserves of portland cement and the aggregates."

Dunn said that the eastern U. S. suffers from an inferiority complex about rock raw materials but that it is not true that all valuable mineral deposits are west of the Mississippi or north of the Canadian border. "Having discovered or worked on several deposits and mineral prospects of great potential in the East in the past few years, my view is an optimistic one," he added.

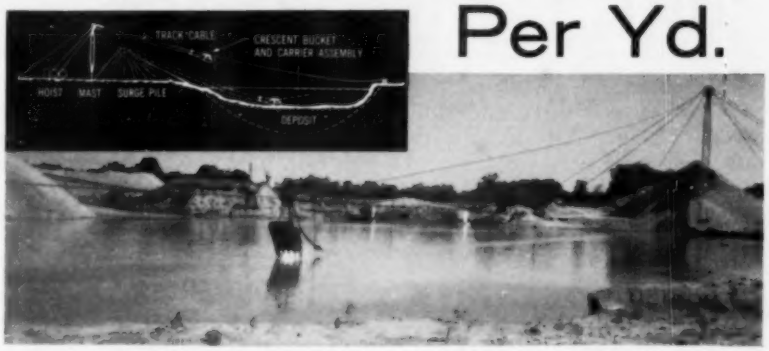
Iron Range To Be Developed On Central American Coast

Evaluation of iron ore deposits in Costa Rica's Guanacaste Province is being conducted on an 80-square mile concession awarded to International Iron, Inc. of Houston, Tex., and San Jose, Costa Rica. The ore ranges from 45% to 69% iron content and may exceed 400 million tons.

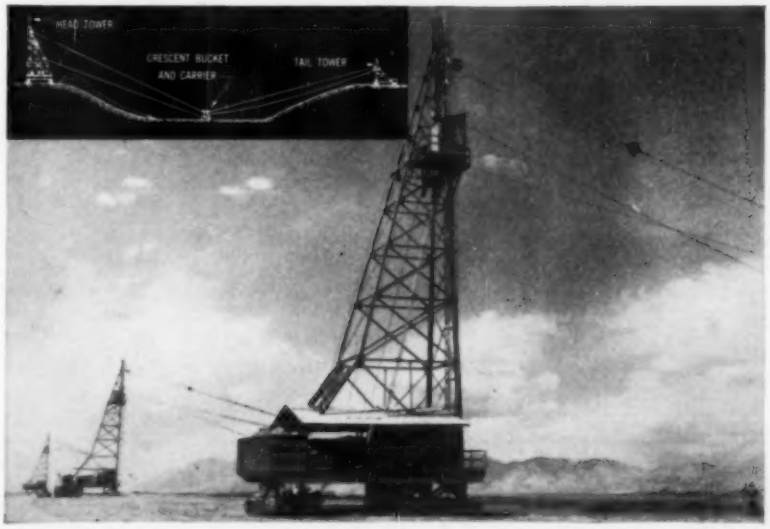
Field engineers and geologists are determining the extent and nature of the deposits which were discovered in mid-1959 by A. W. Dugan, an engineer from Houston, Tex.

The largest series of deposits occur within one to five miles distance from the Pacific Ocean and suitable shipping and loading points. The ideally located deposits are scattered in an area of approximately eighty square miles.

Dig and Haul for 8¢ Per Yd.



Sauerman Slackline Cableway excavating hard-to-dig flat rock from 70 ft. of water. Average hauls are 450 ft. to a surge pile which provides a ready reserve for processing. It also allows digging and hauling to continue when the plant or other equipment is down due to weather or other stoppage. Slacklines can dig from ground level to 125 ft. below water, operate over spans up to 1000 ft. Costs from pit to pile average about 8¢ per yd. including labor, power and maintenance.



Sauerman Tower DragScrapers, each equipped with a 5-yd. Crescent bucket, digging and hauling from a lake-bottom deposit. Each 100-ft. head tower is mounted on four sets of tracks. Operating span averages about 1000 ft. The high water table and occasional flooding of the fill area make the job an excellent one for Sauerman Machines, as the wet, sticky material does not provide good footing for wheeled equipment.

Sauerman Machines . . . work high banks . . . deep pits . . . or under water. In most cases, one operator handles digging and hauling from excavation point to hopper or surge pile. Controls can be remotely located for maximum visibility of material and plant.

Request recommendations on your material handling job. Ask for Catalog A for information on Drag-Scrapers in sizes to 15 yds. and Catalog C for information on Slackline Cableways in sizes to 3½ yds.

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NOT IN THE CONTRACT

Before his death, the operator of a filtering plant willed his brain to a scientist. The scientist was sad to hear of the man's death, but overjoyed to get his brain.

After all, it was the scientist's first chance to see a filtering man's thinker.

Doctor: "How's the kid who swallowed the half dollar?"

Nurse: "So far, no change."

A Russian GI, home from a long tour of duty in Siberia, was shocked to find his wife with a newborn baby.

He questioned her vigorously.

"Was it my friend Fyodor?"

"No."

"Well, was it my friend Conrad?"

"No."

"Then it must have been my friend Dimitri."

"No."

In desperation he insisted it had to be one of them—who else could it be?

She replied: "Don't you think I have friends of my own?"

"Grand Coulee!" shouted the bishop when he hit his thumb with a hammer.

"Grand Coulee?" asked a friend.

"Yes," said the bishop. "It's the world's biggest dam."

An old friend complained bitterly that his wife was making his life a hell on earth. "How long have you been married?" another friend asked.

"Twenty horrible, unbearable years," he groaned.

"Why don't you leave her?"

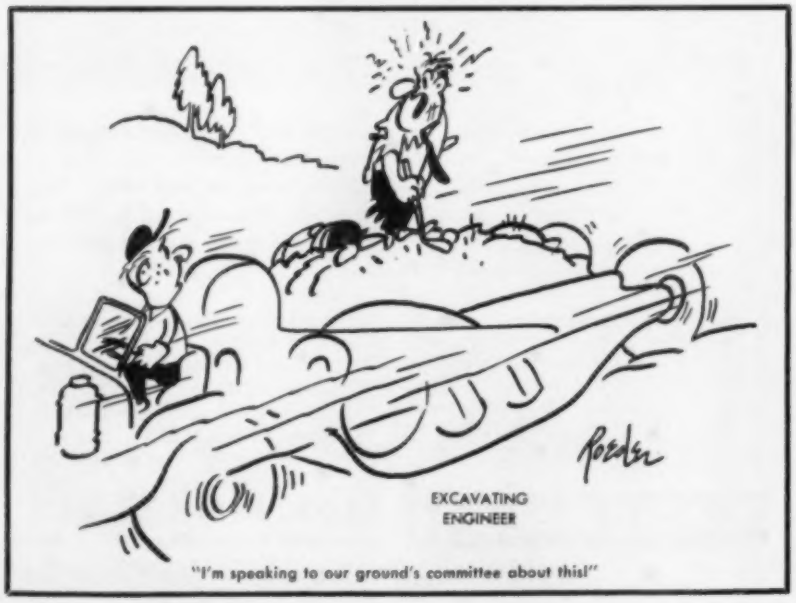
"I'd have walked out long ago," admitted the friend, "but I just can't bear the thought of kissing her goodbye."

A young movie starlet, freshly signed to a studio contract, felt she should travel to Europe under an assumed name and wear dark glasses. On the boat over, she struck up a conversation with a fellow passenger. Immediately she began putting on the dog.

"Wherever I go," she said, "I have to travel incognito. In Pasadena, I was incognito, and no one knew who I was. In Tucson, I was incognito, and no one knew who I was. In Portland, Maine, I was incognito, and no one knew who I was."

Bored beyond words, the passenger smiled politely. "And who," he finally asked, "were you?"

One thing today's teenager learns is that it's the early bird who gets a parking place close to the school.



"I'm speaking to our ground's committee about this!"

First cowboy: "Just call me Tex."

Second cowboy: "You from Texas?"

First cowboy: "Nope. I'm from Maryland . . . but who wants to be called Mary?"

The seven-year-old had gone fishing with her father. After an hour or so, her dad asked, "Are you having any luck?"

She replied indignantly, "No, I don't think my worm is really trying."

Troubled contractor: "My seven-year-old son must be taking vitamin pills that are too strong for him."

Friend: "What makes you think that?"

Troubled contractor: "When I take the kid to a department store, he'd rather stand around the lingerie counter than go to see the toys."

George called his home to talk to his wife. The phone rang and rang—and finally the little woman answered it. "Oh, dear," she moaned, "you got me out of the tub. Please call back in 20 minutes. I'm dripping wet, and I didn't even have a chance to grab a towel."

George said okay, and hung up. Then he redialed his phone number, hurriedly whispering instructions to one of his pals in the office.

The pal took the phone. Again the wife—who couldn't have had time to get back to the tub—answered with a rather annoyed, "Yes?"

The pal said, "Is George ho— . . . oh, look at you! And all wet too!"

A loud scream at the other end of the line was cut off by an equally loud click.

A minister awoke one morning to find a dead mule in front of his house. Calling up the local Board of Health, he said, "This is Reverend Jones. There's a dead mule in front of my house." The man in the health office thought he would be smart and said, "I thought you ministers took care of the dead." "We do," replied the minister, "but we always notify their relatives first."

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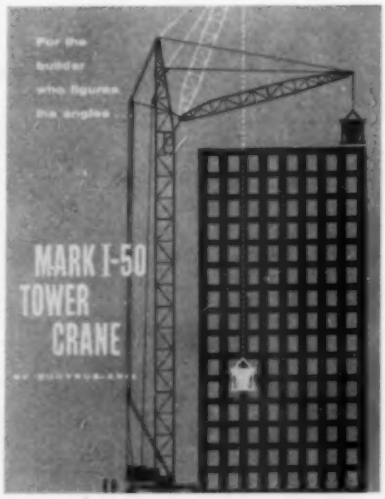
LITERATURE FOR EARTHMOVERS

Subject: **Diesel Engines**
Content: Features of the recently introduced A-C models 10000 and 11000 diesel engines are described in an 8-page catalog. Performance curves and charts, and illustrations, including cutaways of important components, explain these two new engines in the 100 to 210-hp class. Ask for BU 7818.
Where to get: Engine-Material Handling Div., Allis-Chalmers Mfg. Co., Department EE, Milwaukee, Wis.

Subject: **Automatic Self-Priming Pumps**
Content: Three separate 2-page bulletins describe the features of the 1½, 2 and 3-in. Barford automatic self-priming pumps. Included in the bulletins are complete specifications of each pump. All three units feature a self-cleaning body and a safety device which prevents water from entering the crankcase. The pumps guarantee a 25-ft. suction lift. Ask for bulletin 1837, 1838 and 1844.
Where to get: Barfords of Belton Ltd., Department EE, Grantham, England.

Subject: **DragScrapers, Cableways**
Content: A 4-page folder covers in brief form the Sauerman line of DragScraper and slackline cableway machines; Crescent buckets used with draglines; plus data on wire rope fittings and Durolite blocks. Photographs and line drawings show typical installations and illustrate the various Sauerman methods of excavating and hauling.
Where to get: Sauerman Bros., Inc., Department EE, 622 S. 28th Ave., Bellwood, Ill.

Subject: **First U. S. Tower Crane**
Content: An illustrated 4-page bulletin describes the recently introduced Bucyrus-Erie Mark I-50 tower crane. The crane is designed to cut the cost of construction 20 to 40% on such jobs as handling concrete buckets, forms and reinforcing steel. The bulletin points to



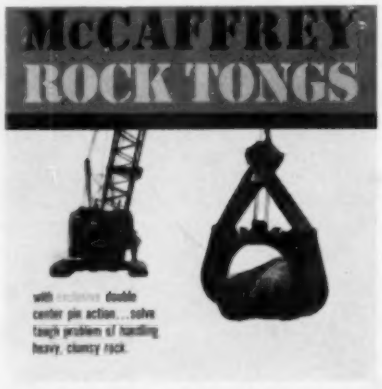
such features as a 5-position cab that allows the operator to move up with the job, and to the self-erecting ability of the Mark I-50. Designed for truck transport, the heaviest component weighs only 25,000 pounds. When working, the Mark I-50 travels on a 16-ft. gauge track.
Where to get: Bucyrus-Erie Co., Department EE, South Milwaukee, Wis.

Subject: **Logging Rigging**
Content: A 24-page logging rigging catalog No. 185F describes and illustrates the complete ESCO logging rigging line for high-lead and tractor logging operations. The new catalog covers all logging rigging items including ferrules, hooks, mainline rigging, pans, shackles, sockets and tag chains. Catalogs for other ESCO logging equipment are No. 186, land clearing blade; No. 207, log grapples; and Nos. 208 and 209, 500-ton swage press and the 165-ton swage press.
Where to get: ESCO dealers or ESCO Corp., Department EE, 2141 N.W. 25th Ave., Portland 10, Ore.

Subject: **Wheel Tractor**
Content: Available from Caterpillar is a 12-page user's report on the Cat 619B wheel tractor. Job reports and applications are all well illustrated to show the ability and work capacity of the 14-yd. struck or 18-yd. heaped No. 442 Lowbowl scraper and 25-ton Athey PR619 rear dump trailer. Reports show savings in operating costs and time. Ask for form No. D010.
Where to get: Caterpillar Tractor Co., Department EE, Peoria, Ill.

Subject: **Arc Welders**
Content: The full Lincoln Electric line of arc welding products is described in a 40-page bulletin entitled *Weldirectory of Arc Welding Electrodes, Equipment and Supplies*. This bulletin presents information on AWS electrode classification and discusses correct electrode selection for every type of welding application. Arc characteristics, welding procedures, and physical properties are listed for each electrode including stainless steel, cast iron, and hardsurfacing types, as-well-as those designed for mild and low alloy and high tensile steel welding. Ask for bulletin 7000.7.
Where to get: Lincoln Electric Co., Department EE, Cleveland 17, Ohio.

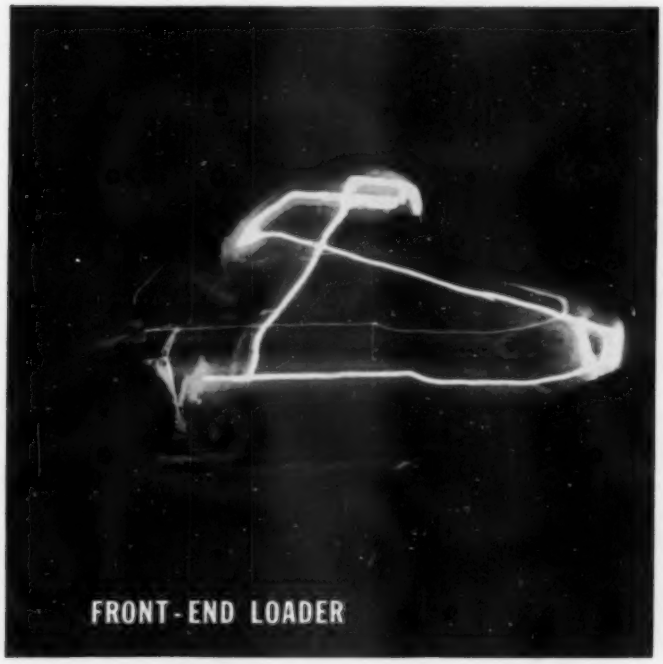
Subject: **Rock Tongs**
Content: Complete information on McCaffrey rock tongs has been assembled in a new 2-color folder. A



series of on-the-job photos demonstrate full advantages of the tongs in field operation. Also included is a detailed, specification chart.
Where to get: M. P. McCaffrey, Inc., Department EE, 2121 E. 25th St., Los Angeles 58, Calif.

"RIVERS OF LIGHT" SHOW HOW SKOOPER OUTPERFORMS FRONT-END LOADER

SKOOPER'S standstill loading creates a light pattern that's short and compact... not long and extended like the one for the loader!



Cycle Test Proves SKOOPER Best!

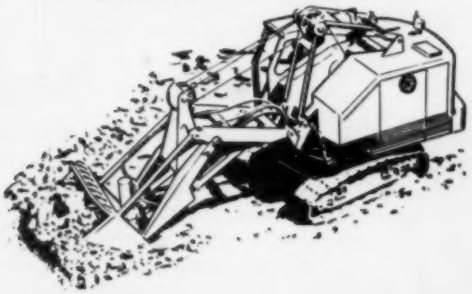
Shown here are actual time-exposure photographs of a Koehring 205 SKOOPER and a rubber-tired front-end loader of similar bucket capacity going through actual digging and dumping cycles under identical conditions. A light was attached to the bucket of each machine and the light pattern traced by each bucket was recorded by time exposure photography.

The light patterns show that with SKOOPER, all motion means work . . . there are no flying starts, no spinning tires, no churning crawlers, no waste drive-in, back-off motion . . . SKOOPER stays in one spot and really bails dirt, delivers big loading tonnages, using less horsepower with less maintenance!

See your Koehring distributor for complete details on the profit pattern that SKOOPER can produce for you!

K-100

There's Nothing Like it on Wheels or Tracks!



KOEHRING

DIVISION OF KOEHRING COMPANY

Milwaukee 16, Wisconsin

EQUIPMENT YOU OUGHT TO KNOW ABOUT

Concrete Buckets Added to Erie Strayer Line

Concrete buckets are now included in the Erie Strayer line of materials handling equipment. According to a company brochure just published, the buckets embody a new design principle that replaces gears and cogs with a linkage system. Benefits claimed are smooth, positive discharge control, any volume desired, and less physical effort to operate.

The concrete buckets come in two models—upright and laydown. Both are available with manual or air control.

With this addition, Erie's line of materials handling equipment includes clamshell buckets for digging, rehandling, dredging; and grabs and grapples for logs, rocks and scrap.

Manufacturer: Erie Strayer Co., Department EE, 3715 Poplar St., Erie, Pa.

International 105-Hp Crawler Tractor

Powered by a six-cylinder International D-554 diesel engine, the new International TD-15 crawler develops 105 engine horsepower at 1,650 rpm. Drawbar horsepower is 85, and the unit has a 23,750-lb. maximum drawbar pull. The crawler features in-built, gasoline-conversion, push-button, all-weather starting of the 4-cycle, valve-in-head type engine. A 6-speed, full-reverse transmission allows single-stick shifting. Forward-reverse direction is changed through use of the shuttle bar.

A transmission oil pump circulates and filters lubricant for longer gear life. Transmission life has been lengthened with tapered, anti-friction bearings of increased capacity, heavier shafts and deeper, stronger gear teeth. Positive temperature control is accomplished through use of pressure-type cooling teamed with a large-capacity radiator.

The engine clutch is of the dry type —a 15-in. singleplate, overcenter device with sintered-metal facing and automatic clutch brake with sintered-metal facings. According to the manufacturer, steering clutch discs outfitted on the TD-15 outlast previous types and are capable of handling greater torque loads.

High dry-type 99.8% air cleaner efficiency is attained. The cleaner is mounted under the hood, and a transparent, quick-dump collector simplifies servicing. A dash indicator shows red when the element needs servicing.

Undercarriage strength of the TD-15 features precision-welded, double-box-beam track frames, drum-type front idlers, frame-welded track chain guides and self-cleaning strutless track links. The TD-15 is the only crawler in its power class with the shock-load prevention of ball-joint suspension. Heavy-duty, brushing type dura-rollers—six on each side—require lubrication only at 1,000-hour intervals.

The crawler is available in 74 and 62-in. gauge tracks. Shipping weight is 22,500 pounds for the 74-in. model and 22,150 for the 62-in. version.

Manufacturer: International Harvester Co., Department EE, 180 N. Michigan Ave., Chicago 1, Ill.

10E61

BUCYRUS-ERIE COMPANY, South Milwaukee, Wisconsin

BUCYRUS ERIE®

Ellicott Dredge

RECLAIMS SWAMPLAND

For Residential Development

Operating company official states, "We are well pleased with the operation of the all-hydraulic control system. *It is excellent.* It has insured very economical ease of operation."

New residential area was created by filling swampland on the South Carolina coast adjacent to the Inter-coastal Waterway. The contractor, the Chatham Dredging Company, chose to handle the job with a 10" DRAGON® model portable, hydraulic dredge designed and manufactured by Ellicott. Influencing the contractor's choice were field-tested, advanced design features such as complete electro-hydraulic operation with centralized controls, a two-piece rectangular hull which can be assembled either ashore or in the water, and precision machinery easily accessible for servicing . . . eliminating costly delays for maintenance of vital operating parts.

Electro-hydraulic control of all moving parts gives greater handling ease and significantly reduces operator fatigue. Man size working and walk-around space between hull and machinery permits ventilation and easy safe inspection. The 40'x16'x4' "Chatham" digs to a maximum 20 ft. depth. It can pump fill materials through pipelines up to 2500 ft. long and has a total rated output of 325 cubic yards per hour. A 319HP diesel engine provides power.

Write for Bulletin 980 for complete design details and application potential of the DRAGONS. A DRAGON may be just what you need.

ELLICOTT MACHINE CORPORATION, Baltimore 30, Maryland, U.S.A.; Ellicott-Brandt, Inc., Baltimore, Maryland; Ellicott Fabricators, Inc., Baltimore, Maryland; McConway & Torley Corp., Pittsburgh, Pennsylvania; Timberland-Ellicott, Limited, Woodstock, Ontario, Canada; Dragues Ellicott France, Paris, France; Dragas Ellicott do Brasil Ltda., Rio de Janeiro, Brazil; Ellicott de Mexico, Mexico City, Mexico.

Successors to the floating dredge business of the Bucyrus-Erie Company and the American Steel Dredge Co. Complete engineering, design and construction service.

ELLICOTT MACHINE CORPORATION
1619 Bush Street • Baltimore 30, Maryland

Send me a copy of Bulletin 980, describing the complete line of DRAGON model dredges.

Name_____

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4441

Dozer Has

A new hydraulic system available for all blades used on the Euclid model C-6 tractor has been announced by Euclid and Gar Wood Industries of Wayne, Mich. Designed to meet the speed requirements of the Torqmatic Drive C-6, the new hydraulic package consists of a single cylinder and a variable volume piston pump known as the Gar Wood Variacs.

The Variacs pump delivers oil only when needed for raising and lowering the blade . . . no oil circulates in the

New Equipment . . .

Airborne Crane-Excavator

Koehring's new model 155 is a 7-ton capacity, self-propelled crane-excavator which can be transported by air and dropped by parachute. Fourteen such rigs are being built by Koehring for the U. S. Army Corps of Engineers.

It has an extremely low profile, 81 inches from the ground to top of cab, to allow loading without disassembly into transport aircraft. No counterweight is needed or included.

The 155 weighs less than 16,000 pounds and lifts 14,000 pounds with 24-ft. boom at 10-ft. radius. To reduce overall weight without sacrificing strength, the side stands of the machine are made of Tri-Ten steel. Housing covering main machinery and engine is fabricated of aluminum. The machine has been successfully air-crated and dropped by parachute.

The machine's power plant can be started in extreme temperatures. To condition it against fungus growth and high humidity and moisture conditions, the airborne machine is sprayed with several coats of solutions and primers in addition to painting. Radio interference suppression is included on the machine and its ignition system is carefully grounded and insulated.

Manufacturer: Koehring Div., Koehring Co., Department EE, 3026 W. Concordia Ave., Milwaukee 16, Wis.

Hydraulic Blade

system in the hold position so there is no build-up of heat.

In addition to faster blade speed, lifting power of this new single cylinder design is up to 7 tons greater than other dual cylinder dozer mountings because of greater mechanical advantage of the lever arm. Operator visibility is improved since corners of the blade are not hidden by hydraulic cylinder or the A-frame.

Manufacturer: Euclid Div., General Motors Corp., Department EE, Hudson, Ohio.

another ERIE exclusive

UNCONDITIONALLY GUARANTEED*

CORNER BARS

Erie Corner Bars are unconditionally guaranteed* against breaking.

Erie is one manufacturer who goes beyond the accepted 180-day warranty against defects in this critical area. Erie's uniquely designed corner bars are the reason. They're shorter, thicker, wider, hence stouter than any other make.

The hardened steel bushings in Erie Corner Bars are machined to a close tolerance. Other buckets have 3 to 10 times more play than Erie permits at this critical point. Both top and bottom pins in Erie Corner Bars are oversize and are pressure lubricated through recessed Alemite Fittings.

Corner Bar Construction is only one reason why Erie Clamshell Buckets deserve your serious consideration. Write today for your copy of Erie's latest literature.

*GUARANTEE

Erie Corner Bars, like Erie Teeth, are guaranteed against breakage for the life of the bucket. All broken corner bars are replaced "No Charge" f.o.b. Erie.

6 MORE ERIE FEATURES THAT SAVE YOU MONEY

- Fewer Moving Parts
- More Beef Built *into* Moving Parts
- More *Quality* Too
- Lower Headroom
- Recessed Alemite Fittings
- Hardened Steel Sheave Bushings

WE CAN PROVE OUR ADVERTISING CLAIMS!

ERIE

BUCKETS THE WORLD OVER

ERIE STRAYER COMPANY

DEPT. No. E-71 • 971 RUDOLPH AVENUE • ERIE, PENNSYLVANIA

105-Hp Motor Grader

Allis-Chalmers has added a 105-hp motor grader to its construction machinery line. Designated the 145-T, it is a medium weight motor grader powered by the turbocharged 105-hp 7000 series engine. The machine weighs 21,640 pounds.

According to the manufacturer, the 145-T offers high fuel economy, easy starting and quick response for real ability to hang onto the load.

Introduction of the new unit gives Allis-Chalmers a five-model motor grader line. This includes the model D and the model DD—both with 58 horsepower, the 80-hp model 145, the 105-hp model 145T, and the 127-hp model 45. The weight of the new model is 21,640 pounds.

Manufacturer: Allis-Chalmers Mfg. Co., Department EE, Milwaukee 1, Wis.

Lightweight Aluminum Centrifugal Pumps

Portable engine-driven centrifugal pumps in 1½ and 2 in. sizes have been added to the Rapidayton line of the Tait Mfg. Co.

Known as the Rapidayton Nomad, the self-priming pumps are made of a special aluminum alloy which combines light weight with great strength and abrasion resistance. A hand grip makes the unit easy to carry. The weight is 42 and 44 pounds for the two sizes.

Powered by a four-cycle air-cooled Briggs & Stratton engine with recoil starter, the Rapidayton Nomad is equipped with a 2-hp motor in the 1½-in. size and with a 3-hp motor in the 2-in. size.

Total head for both models exceeds 90 feet with capacities ranging beyond 5,000 gallons per hour for the 1½-in. size and beyond 7,200 gph for the 2-in. model. Both pumps are built to handle water with a high percentage of solids without clogging.

Manufacturer: Tait Mfg. Co., Department EE, 500 Webster St., Dayton, Ohio.

Improved 15-B Crane

Bucyrus-Erie is introducing a new Series Two of its 15-B crane-excavator, with many new and improved features to increase production and reduce operating costs. The machine is available as a crawler or carrier-mounted unit, fully convertible for crane, dragline, clamshell, hoe, or shovel service.

As a hoe or shovel, the 15-B Series Two may be equipped with ⅜-cu. yd. dippers. It is rated at 18-ton crane capacity.

The 29 listed major improvements on the 15-B Series Two crawler include increased horsepower, wider and longer crawlers, and higher capacity brakes. Other major new features include: Tri-Ten steel boom and 12-point boom suspension with anti-friction sealed sheave bearings.

Self-Propelled

A new self-propelled, inplace soil stabilization machine is called the BROS model SPRM-84 Roto-Mixer. It is a heavy-duty machine for mixing, blending, aerating and pulverizing windrowed and subsurface soil

Series Two Excavator

Manufacturer: Bucyrus-Erie Co., Department EE, South Milwaukee, Wis.

Soil Mixer

materials to maximum depth of 10 inches.

Mixing and blending of windrowed gravel materials is accomplished at rates of 3,000 to 5,000 cubic yards per hour. Subsurface mixing of scarified materials is done at rates up to 1,000 yards per hour.

All drive and mixing controls are clustered on the operator's deck for complete ease of operation. The design permits full visibility in all directions.

The SPRM-84 is powered by a diesel engine rated at 140 net useable horsepower at 1,800 rpm. It has 12 closely arranged forward speeds through a range of 0.5 to 8.5 mph, and three reverse speeds. Turning radius is 23 feet.

It has front axle drive and front wheel hydraulic Orbitrol steering. Overall length is 18 feet and machine width is 8 feet. Mixing chamber width is 7 feet. Mixing rotor has two speeds —230 and 320 rpm.

Optional equipment includes oil or water spray bar; pump flow meter; controlled by-pass; and drive lights for night operation.

Manufacturer: Bros, Inc., Road Machinery Div., Department EE, 1057 10th Ave. S.E., Minneapolis 14, Minn.

now...FOUR "modern" EARTH AUGERS

TRACK-MOUNTED MODEL

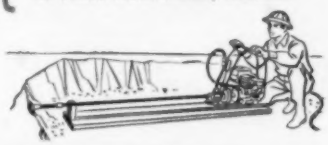
for accuracy and ease of operation

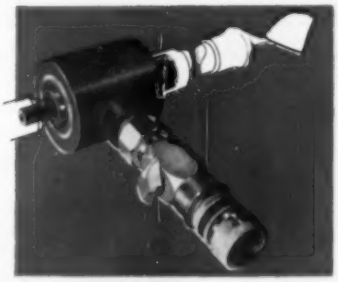
One man can operate it, averaging 5' per minute when drilling 2½" hole and can ream up to 18'. Drills long range laterally (200' or more). Powered by Briggs & Stratton engine. Accurate, portable, hydro-dynamic dirt flush action.

3 HP-2 (without clutch) $254.00
3 HP-1 $344.00
575 HP-2 $495.00
920 HP-1 $670.00
All Prices F.O.B. Exeter, Nebraska

CUT LABOR COSTS

"MODERN" Earth Auger—either track-mounted or hand-held model, drills under shrubbery, lawns, walks, terraces, streets, railroads, highways without damage to property or disrupting traffic. Water pressure flushes out dirt loosened by the auger; return auger bits will enlarge hole to desired size on return drilling.





HAND-HELD MODEL

for Economical Drilling

Hydrodynamic dirt flush; first job pays for itself, 4" and up dia. return augers; extension shafts 5' length, ¾" dia. available; use any length pipe.

Complete with 2" pilot auger with ½" or ⅝" drive shank. $49.95

Contact your wholesaler or write:

Modern Products, Inc.
P.O. Box 76, Dept. EE, Exeter, Nebraska

TS-260
18-yd—230-hp

TS-360 30-yd—340-hp

TS-160 11-yd—155-hp

ONLY ALLIS-CHALMERS ALL-HYDRAULIC MOTOR SCRAPERS give you full-power advantages in every phase of the cycle

. . . plus important new improvements to increase production, provide new strength and life. Now you get even more dirt-hustling horsepower from Allis-Chalmers. Every model offers you full-power steering, loading, spreading, and traction. New improved design and tougher metals bring extra strength and durability to transmissions, differentials, and hitch assemblies. Independent apron control on the TS-360 speeds up loading and spreading in unusually dry, free-flowing materials.

Allis-Chalmers low-maintenance, all-hydraulic design, backed up by major performance and durability achievements, lets you challenge today's toughest earth-moving jobs confidently. See the '61 line in time to *step up your "bid-power" with full-power features.*

Select the size that fits your jobs best from the world's only complete line of *full-power*, all-hydraulic motor scrapers. From ditching to dam building, there's an Allis-Chalmers motor scraper with the right combination of job-proved features to match any earth-moving situation. Prove it to yourself with a comparative demonstration before you bid your next job. *Allis-Chalmers Construction Machinery Division, Milwaukee 1, Wisconsin.*

NEW! 13% more capacity in the TS-160 . . .

The new TS-160 now carries 8.5 struck yards . . . 13% more than previous models. The TS-160 is the only machine in its class backed up with "big" scraper performance features. The "160" also gives you the widest cutting surface for easier loading, smoother finishing . . . the highest apron opening for fast, clean spreading. See the 155-hp TS-160 today. It'll work alone, or fit right into your largest earth-moving spread.

STEP UP YOUR

Performance
Operator comfort
Wearability
Ease of maintenance
Reliability

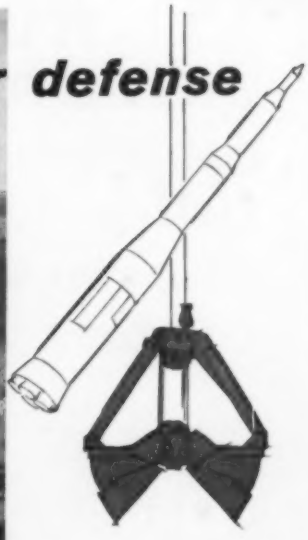
WITH

ALLIS-CHALMERS

POWER FOR A GROWING WORLD

WILLIAMS BUCKETS DIG BIG

—for defense



Construction of the first Minuteman base in the country began in March. The intercontinental ballistic missiles will be stored for instant use in 150 underground silos controlled by 15 launching centers.

It takes a lot of blasting and big digging to put a Minuteman to bed in the solid rock of central Montana. The chore for Williams Buckets is excavating shot rock from missile silos to a depth of 50 feet. It's the kind of job the Williams Bucket is built to do—heavy, steady work with no breakdowns.

Alloy steel construction, welded throughout, gives Williams clamshell and dragline buckets quality tough enough for any job.

The catalog will give you details on buckets for every application.

WILLIAMS BUCKET DIVISION
THE WELLMAN ENGINEERING CO.
113 ST. CLAIR AVE., N.E., CLEVELAND 14, OHIO, U. S. A.

E-1

NAME_____

COMPANY_____

ADDRESS_____

NOTES from the Manufacturers

Allis-Chalmers Mfg. Co., Milwaukee, Wis., reports construction of a new multi-million dollar engine manufacturing plant at its Harvey (Ill.) works is nearing completion. Ground for the new plant was broken April 28, 1960. Initial production will center around the company's line of nine basic diesel and gasoline engines. Approximately 515,000 square feet of floor area is provided by the new 1,100x440-ft. building.

Bucyrus-Erie Co., South Milwaukee, Wis., has appointed Jorge A. Rossi export sales manager, international division. Robert T. Craig, former export sales manager, remains as director of the company's international division and a consultant on sales matters and related activities. Rossi joined Bucyrus-Erie's international division in 1946 as a sales and distributor representative. A native of Argentina, Rossi attended LaPlata University, Buenos Aires.

J. A. Rossi

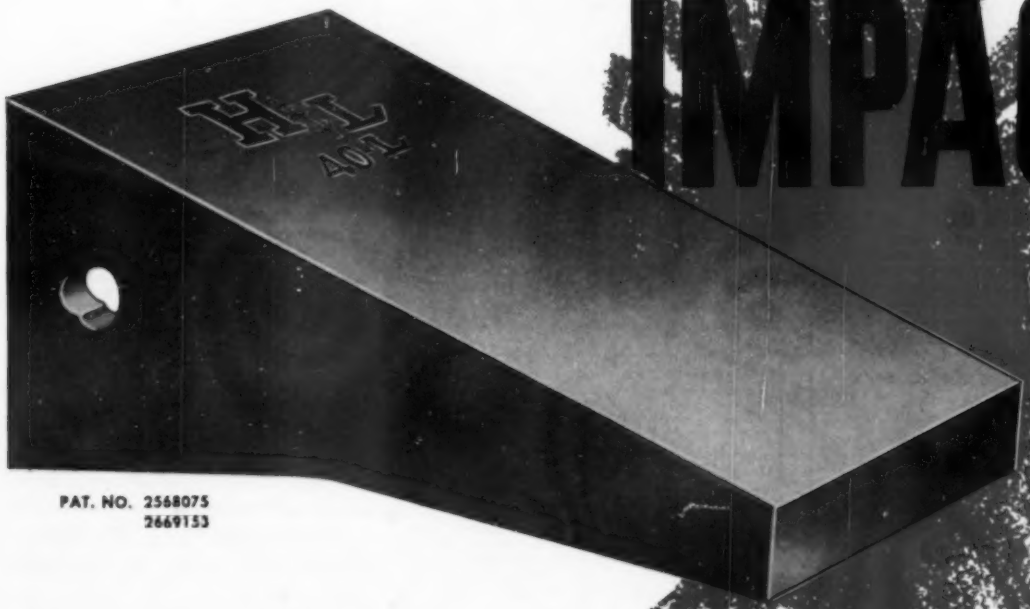
LeTourneau-Westinghouse Co., Peoria, Ill., has named Lewis J. Burger president, succeeding Merle R. Yontz. Burger served consecutively at General Electric as general manager of the gear motor and transmission components department, gas turbine department, switchgear and control division, and laboratory operations of the component products division. He graduated from Purdue University in 1935 with a B. S. degree in mechanical engineering.

L. J. Burger

H&L *Teeth that really dig*

ONE PIECE, FORGED NICKEL ALLOY STEEL

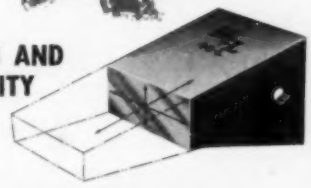
TAKES THE IMPACT



PAT. NO. 2568075
2669153

THE 40-L ONE-PIECE, FORGED POINT OF NEWLY FORMULATED **SUPER STEEL** WITH UNIFORM GRAIN FLOW AND CONSTANT HARDNESS FROM CORE THROUGHOUT POINT GIVING EXTREME LONG WEAR WITH RESISTANCE TO IMPACT.

FOR SHOVELS 8 AND 9 YARD CAPACITY



H&L has a point for every type of digging job, and for every make and model of digging equipment.

H&L TOOTH COMPANY
1540 SOUTH GREENWOOD AVENUE
MONTEBELLO, CALIFORNIA

SPECIALISTS SPECIALIZING IN THE MANUFACTURE OF BETTER DIGGING POINTS FOR OVER 31 YEARS

TO ADVERTISE: All advertising in this section is payable in advance. Rate $1.00 per line, or $12.00 per inch of 12 lines. Minimum charge $4.00. No discounts; no commissions. Please count your copy carefully to avoid delay. Each line contains 41 characters. Count spaces and punctuation as one character each. Be sure to enclose the correct amount of money with your order. Rates and conditions subject to change without notice. Closing date—10th of preceding month. Example: January closes December 10th.

TO INQUIRE: Be sure to address your inquiry to the advertiser by using the listed address. If box number is used, mail your letter in care of Excavating Engineer, South Milwaukee, Wisconsin. Write each advertiser a separate letter. Do not write us for name and address of advertiser. This information will not be given out. We have no information about the equipment advertised other than that shown in the advertisements themselves.

LARGE SHOVELS, CRANES, DRAGLINES — 3 YDS. & UP

EUCLIDS
Rear, Bottom and Scrapers

12-yd. Bucyrus-Erie dragline.
9-yd. Bucyrus-Erie dragline.
8-yd. Bucyrus-Erie shovel.
6½-yd. Bucyrus-Erie shovel.
4-yd. Bucyrus-Erie shovel.
4-yd. Bucyrus-Erie dragline.
3-yd. Bucyrus-Erie shovel.
2½-yd. Bucyrus-Erie shovel and dragline.
1½-yd. Bucyrus-Erie shovel.
5-yd. Manitowoc shovels and drags.
6-yd. Lima dragline and shovels.
Large stripping shovels.
Other equipment available, not listed above.

WILLIAM LUBRECHT, III
Construction Equipment
311 W. Diamond Ave. Hazleton, Pa.
Phone: GLadstone 5-4041 or 5-0523

HEAVY EXCAVATION EQUIPMENT
DRAGLINES, SHOVELS, CRANES, DRILLS, TRUCKS

9-W B.E. Elec. Drag, 200′, 8 yd. or 160′, 10 yd.
9-W B.E. Diesel Drag, 165′, 12 yd.
7-W B.E. Diesel Drag, 140′, 7 yd.
7400 Marion Diesel Drag, 175′, 13 yd.
7400 Marion Elec. Drag, 175′, 12 yd.
625 Page Diesel Drag, 160′, 9 yd.
631 Page Elec. Drag, 200′, 8 yd.
621-S Page Diesel Drag, 125′, 7 yd.
183-M Marion Diesel Drag, 130′, 8 yd.
200-W B.E. Diesel Drag, 125′, 6 yd.
2400 Lima Elec. Drag, 130′, 6 yd.
2400 Lima Diesel Drag, 130′, 6 yd.
7200 Marion diesel drag, 135′ 5 yd.
4500 Manitowoc Drag, 120′, 5 yd. & 140′, 4 yd.
120-B B.E. Elec. Drag, 115′, 5 yd.
71-B B.E. Crane with 160′ boom.
3900, 3500 & 3000 Manitowoc Cranes.
111-M Marion Drag, 100′, 4 yd.
1055 P&H Diesel Drag, 80′, 4 yd.
1601 Lima 4 yd. Shovel/Drag.
1201 Lima Drag, 85′, 3 yd.
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Bucyrus-Erie 170-B electric shovel. Located Anthracite region. Available immediately. Excellent condition. For further information write:

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Marion 93M, 2½ yard shovel with a Cummins Diesel engine. This machine is in excellent condition.

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MISCELLANEOUS

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1—Link-Belt model LS-80 crane with 50' boom, Rudomatic tagline, Buda gas engine, s/n 7074.

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1—Bucyrus-Erie 10-B crawler-mounted backhoe, s/n 20429, powered by Buda model 326-hp. 6 cylinder gasoline engine, s/n 11579. Backhoe with 14' boom, 4'6" stick. 29" wide bucket at side cutters with 3 teeth mounted on 9' long x 7'8" wide crawlers with 14" pads.

1—Bucyrus-Erie 22-B ¾-yd. heavy-duty crane and clamshell with 55-ft. boom, Rudomatic tagline, long wide cats (12-ft. 9-in. long, 10-ft. 6-in. wide, 30-in. treads). General Motors diesel power, machine s/n 114843. Perfect condition.

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MISCELLANEOUS

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1—Link-Belt LS-71 dragline, 45' boom, UD-14A engine. Serviced $5,500

1—Koehring 304 ¾-yd. shovel GM 3-71 engine.

1—Lorain TL-25 dragline, 35' boom, Cat D315 engine, wide tread $6,750

1—Northwest 25 dragline, 35' boom, Cat D4600 engine $7,500

1—Quickway model "L" hoe, U-9 engine mounted on FWD 4x4 commercial chassis. Clean, serviceable. A fine rig $4,750

1—Bucyrus-Erie 10-B hoe, Hercules gas engine. Look good, workwise as-is ..$1,850

1—Bucyrus-Erie 22-B dragline, 40' boom UD-14 engine. Serviced, cleaned and painted.

1—Bucyrus-Erie 38-B combination dragline and shovel, GMC 6057C engine, Torcon converter. Late model.

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1—Lima 604 shovel attachment complete, good condition $3,500

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1—Bucyrus-Erie 120-B dragline attachment complete, make offer.

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1—Bucyrus-Erie 15-B shovel attachment complete, near new $750

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1—Caterpillar D6, 8U series, 6S dozer #25 C.C.U. Clean, serviceable.

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1—GM 6-110 engine complete, clutch, PTO speed reducer, 1.76-1 ratio, skid base with fuel tank, air intake extensions dry type cleaners, for crusher application.

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Bucyrus-Erie model 15-B, serial No. 33505 with AC model HB351 gasoline engine, ½-cu. yd. hoe, 16" treads, standard crawlers. Currently being rebuilt in our shop.

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Bucyrus-Erie model 38-B shovel, Serial No. 73291 with Caterpillar D13000 diesel engine with gasoline starting engine with electric starter. 13'7" crawlers with 33" treads. Machine currently being rebuilt in our shop.

Bucyrus-Erie model 51-B 2½-yd. shovel, serial No. 62581, with Caterpillar D17000 diesel engine, standard crawlers with 36" treads. Low hours. Reconditioned and in very good condition throughout.

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Northwest model 25 ¾-yd. backhoe, SN 111/313, GM diesel, reconditioned.

Northwest 25 backhoe, S/N 17808, reconditioned.

Northwest 25 backhoe, S/N 19063, Cat diesel engine, reconditioned.

Northwest truck crane, model 25 S/N 11957, mounted on Dart carrier, good condition.

Northwest model 25 dragline, S/N 19078, 35' boom, Cat diesel engine, reconditioned.

Insley model L dragline and clamshell, S/N 7389 reconditioned.

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Backhoe attachment for Northwest 25, good condition.

Shovel attachment for TL-25 Lorain, good condition.

Backhoe attachment for TL-25 Lorain, good condition.

Shovel attachment complete for LS-50 Link-Belt.

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Bucyrus-Erie 22-B dragline, S/N 56343, IHC UD-14, 45' boom, standard tracks, as is.

Bucyrus-Erie 22-B dragline, S/N 75283, IHC UD-14, 40' boom, reconditioned.

Bucyrus-Erie 22-B hoe, S/N 102696, standard boom, Cat D318, tractor-type tracks, reconditioned.

Bucyrus-Erie 22-B hoe, S/N 101143, standard boom, IHC UD-14A, tractor-type tracks, extra counterweight, reconditioned.

SMALL SHOVELS, CRANES, DRAGLINES — UP TO 2½ YDS.

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Insley model L dragline, S/N 7007, Cat D315, 40' boom, 30" track shoes, as is.

Lorain TL-20 dragline, S/N 15456, 35' boom, Cat D4400, 22" shoes, as is.

Northwest 25 dragline, S/N 11496, 30' boom, 28" shoes, GMC 3-71, as is.

Bucyrus-Erie hoe attachment (st. boom) for 15-B, as is.

Bucyrus-Erie hoe attachment, cambered boom, for 22-B, reconditioned.

Bucyrus-Erie 20-A hoe attachment with ¾-yd. Esco dipper for 22-B.

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Link-Belt LS-98 1-yd. comb. crane-drag-hoe Cat 318 diesel, 1955, long wide cats, 30" treads, 55' boom (30-10-10-5 with pendants), ex. ctwt., seal track rollers, ind. rapid boom, ind. swing and propel, power down main drum, swing brake, foot throttle, fairlead, near new cambered boom hoe attach. incl. 42" dipper, 2,900 hrs., $32,500.

Link-Belt K360 1½-yd. comb. crane-drag-shovel, Cat 13000 diesel, Twin Disc fluid-coupling, 1954, wide cats, 32" treads, 60-ft. boom (35-15-10 with pendants), 40' jib (20-10-10), ex. ctwt., ind. rapid boom, foot throttle, fairlead, tagline, 1¾-yd. shovel front (used 4 mos.) with Amsco dipper, 3,100 hrs., $42,500.

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MISCELLANEOUS

2—Pushin' Cushin' attach. (hydraulic ram push blocks) with push arms, for Cat D9, can be adapted to D8 or equal, for non-decelerated scraper contact, originals traded for these latest models, used 3 weeks, each $4,400.

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Haiss ¾-yd. GP clam, rebuilt, $1,200.

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Insley 1-yd. conc. laydown, excellent, $200.

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Anchor chain 270', for mass land clearing, wt. app. 100# per ft., 2¼" dia. links, in (3) 90' lengths, swivel conn. and swivel ends, $1,000.

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Bucyrus-Erie 54-B shovel/crane, Buda 6DC 1879 engine, s/n 60319, located at Aurora, Colo. $28,000
Bucyrus-Erie 54-B shovel/crane, Buda 8DA 1125 engine, s/n 111968, located at Aurora, Colo. $33,000
Bucyrus-Erie 54-B dragline, Buda 6DC 1879, s/n 24654, located at Leesburg, Ala. .$22,500
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22-B Bucyrus-Erie, ¾-yd., G.M.C. 3-71 diesel engine, 12' long crawlers, 26" treads, 1948, crawlers rebuilt, fairlead, good condition.
45 Bay City, ⅝-yd., Cat D4600 diesel engine, dragline fairlead, 45' boom, long crawlers, 26" treads, good working condition.

SHOVELS

22-B Bucyrus-Erie, ¾-yd., G.M.C. 3-71 diesel engine, 1948, 26" crawler treads, crawlers rebuilt, machine in good operating condition.
29-B Bucyrus-Erie, 1-yd., Cat diesel engine, machine in very good condition, 1-yd. shovel dipper, $2,000 in extra parts included, priced to sell.
34 Lima, ¾-yd., Cat D318 diesel engine, machinery overhauled and in excellent condition, cab panels sandblasted and repainted.
375 American, ¾-yd. shovel, Waukesha gas engine, needs some work but would make a standby or extra shovel for limited loading. Cheap.
30-B Bucyrus-Erie, 1-yd., Cat. D-318 diesel engine, 1959, rental and demonstration machine in like new condition, discounted for rental use.

BACKHOES

38-B Bucyrus-Erie, 1½-yd., Cat D13000 diesel engine, 1953, long cats, 33" crawler treads, 1½-yd., hoe dipper, overhauled in November, excellent.
30-B Bucyrus-Erie, 1 to 1½-yd. dippers available, Cat D318 or G.M.C. 4-71 diesel engines, rental and demonstration machines, excellent, discounted.
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357 Unit wagon crane, 7-ton capacity, Chrysler gas engine, machinery overhauled, cab panels sandblasted and repainted, excellent condition.
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H-2 2 ton capacity, mounted on I.H.C. truck chassis, rear hydraulic outriggers, telescoping boom, priced to sell at $2,000.
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H-3 5-ton capacity, telescoping boom, tandem outriggers, hydraulics overhauled, mounted on 6-wheel drive carrier, tagline reel and bucket.

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K Insley ½-yd., gas engine, long wide crawlers. Serial 3879. Completely rebuilt.

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Cat 12 S/N 9K5009, electric start., all four rear tires recapped.
Galion 118 S/N MD17985 IHC UD-16A diesel, power steering, operators cab.

ATTACHMENTS

51-B Bucyrus-Erie Shovel Front with 2-yd. dipper. No deck machinery. Unused.
22-B Bucyrus-Erie hoe (straight boom). Used.
15-B Bucyrus-Erie center section 15' long. Unused.
Lima 34 swing-type fairlead. Unused.
15-B swing-type fairlead. Unused.

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Indianapolis 18, Ind.

Bucyrus-Erie 22-B shovel, Serial #81232, with Caterpillar D318 engine E3/4J3.
Bucyrus-Erie 19-B shovel, Serial #13016 with 22-B undercarriage, Waukesha Gas Engine J180. Serial #61320D.
Bucyrus-Erie 22-BTC #86258, with 60' boom and fairlead.
Lorain model TL20 serial #18174 backhoe with Waukesha Gas Engine 6BZ144E.
Model TU-3 Snogo snow plow, Serial No. 768, with Climax R-61 engine, Serial No. 15825, mounted on FWD truck.
Koehring model 205 shovel and hoe, ½-yd., Serial No. 5262C, powered with International gas engine #17366. 1948 model.
Model L-41 Lorain hoe with Waukesha gas engine. Serial No. 17832.
Unit model 1020 ¾-cu. yd. shovel, Serial No. 51256, powered with Chrysler gas engine.
K12 Insley ½-yd. backhoe, Serial #3671, powered with Buda engine.

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Adams model 512 motor grader with 13.00 x 24 tires front and rear, cab, scarifier, lights, heater, defroster, windshield wipers, power steering, snow plow and wing. Engine overhauled recently. Price: F.O.B. Lansing $6,250
Austin-Western Master 99 motor grader, cab, windshield wipers, scarifier, lights. Price: F.O.B. Detroit $8,650
Adams model 610 grader, 14.00 x 24 tires front and rear, cab, scarifier, power steering. Price: F.O.B. Lansing $7,900

SMALL SHOVELS, CRANES, DRAGLINES — UP TO 2½ YDS.

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Hopto Model 200TM demonstrator with heavy-duty boom, 24" backhoe bucket, 24" rotating clamshell bucket. Hopto cab and heater, 4 x 4 carrier, with cab, power steering, windshield washer, heater and defroster, fenders and running boards, front wheel locking device, nylon cord tires. Serial #3974. Price: F.O.B. Detroit. .$15,000
Koehring ½-cu. yd. shovel, with GM 2-71 engine, 1948 model, rebuilt in 1956. Serial #C-6520. Price: F.O.B. Lansing.....$4,500
Straight backhoe boom and gantry for B-E 22-B. Price: F.O.B. Lansing $1,250

SCRAPERS-ROOTERS

LeTourneau-Westinghouse model "C" Tournapull with cab and 24" tires front and rear. #GT 4434. Price: F.O.B. Detroit. $12,000
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LeTourneau-Westinghouse model S3 rooter. Like new condition. For use with tractor of 50 hp or more. Price: F.O.B. Detroit. $1,000
LeTourneau-Westinghouse model "C" Tournapull w/P-19 scraper. Engine just overhauled. Serial #4477. Price: F.O.B. Lansing $13,500
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Advertisers in This Issue

Allis-Chalmers 7, 48–49
Aveling-Barford Ltd. 11
Bethlehem Steel Co. 2
Bucyrus-Erie Co. ... 3, 10, 39, 43, 4th Cover
Caterpillar Tractor Co. 8–9
Colorado Fuel & Iron Corp., John A. Roebling's Sons Div. .....3rd Cover
Drake-Williams Mount 19
Ellicott Machine Corp. 44
Erie Strayer Co. 45
Hammerblow Wire Rope Cutter Co. 34
H&L Tooth Co. 51
Hendrix Mfg. Co. 4
Koehring Div., Koehring Co. ... 41
Marion Power Shovel Co. 6
McCaffrey, M. P., Inc. 28
Modern Products, Inc. 47
Northwest Engineering Co. 5
Roebling's Sons Div., John A., Colorado Fuel & Iron Corp. .....3rd Cover
Sauerman Bros., Inc. 37
Twin Disc Clutch Co. ....2nd Cover
Whitmore Mfg. Co. 56
Williams Bucket Div., Wellman Engineering Co. 50

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Caterpillar 14A and 13A series D8's with 8A angle dozers and No. 29 C.C. Real good operating condition and several completely remanufactured.

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Caterpillar model D6 tractor, 9U series, 6A dozer. Double drum rear cable control. Guarded up and with operators guard. Undercarriage components 50% good. Good operating condition.

International TD-6, wide gauge, with new Holt free-spooling skidding winch, Holt hydraulic angle dozer, with front mounted pump. All the guards including overhead operator guard. This machine has been checked over and repaired as necessary. The appearance is very good. Is in good operating condition. The undercarriage averages 60% good $4,750

Caterpillar D6 tractor, 9U series, guarded up, good tractor or drawbar work....$2,500

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International TD-6 with track, crankcase, radiator guards, operator guard. Straight hydraulic dozer. Checked over, repaired. $2,250

MISCELLANEOUS EQUIPMENT

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Cat 8A dozers—14A style $400

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Adams #512 motor grader, diesel powered. 13:00x24 tires on all wheels. 12' blade, scarifier, cab w/heater, defroster. Good running condition $3,500

MISCELLANEOUS EQUIPMENT

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Bucyrus-Erie 22-B with 50' crane boom and extra counterweight, tagline. Powered with Caterpillar D318 diesel. Mounted on Maxi carrier w/8 14:00 x 20 tires. Rebuilt completely in our shops.

Bucyrus-Erie 51-B 2-yd. shovel powered with a Buda diesel. Good operating condition. Rebuilt tracks.

P&H ¾-yd. shovel, equipped with a 55-ft. crane boom, extra counterweight, tractor type tracks with 20-in. flat grousers, powered with a Chrysler industrial gas engine, three-speed transmission on the upper works. General appearance good $6,500

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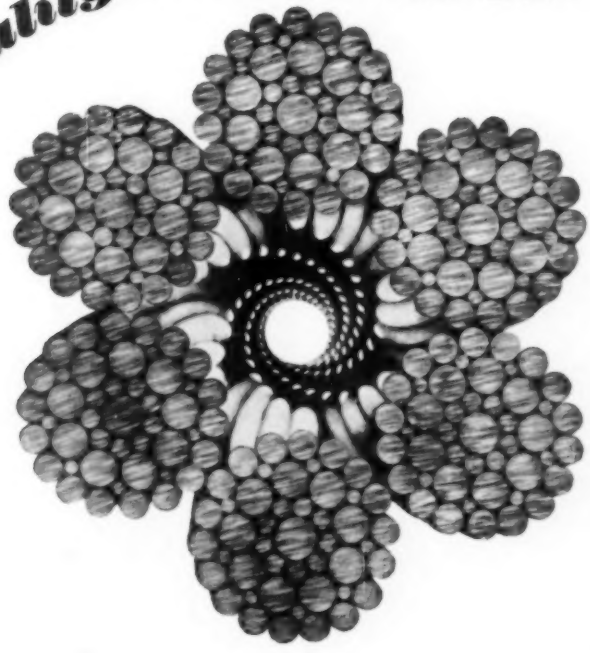

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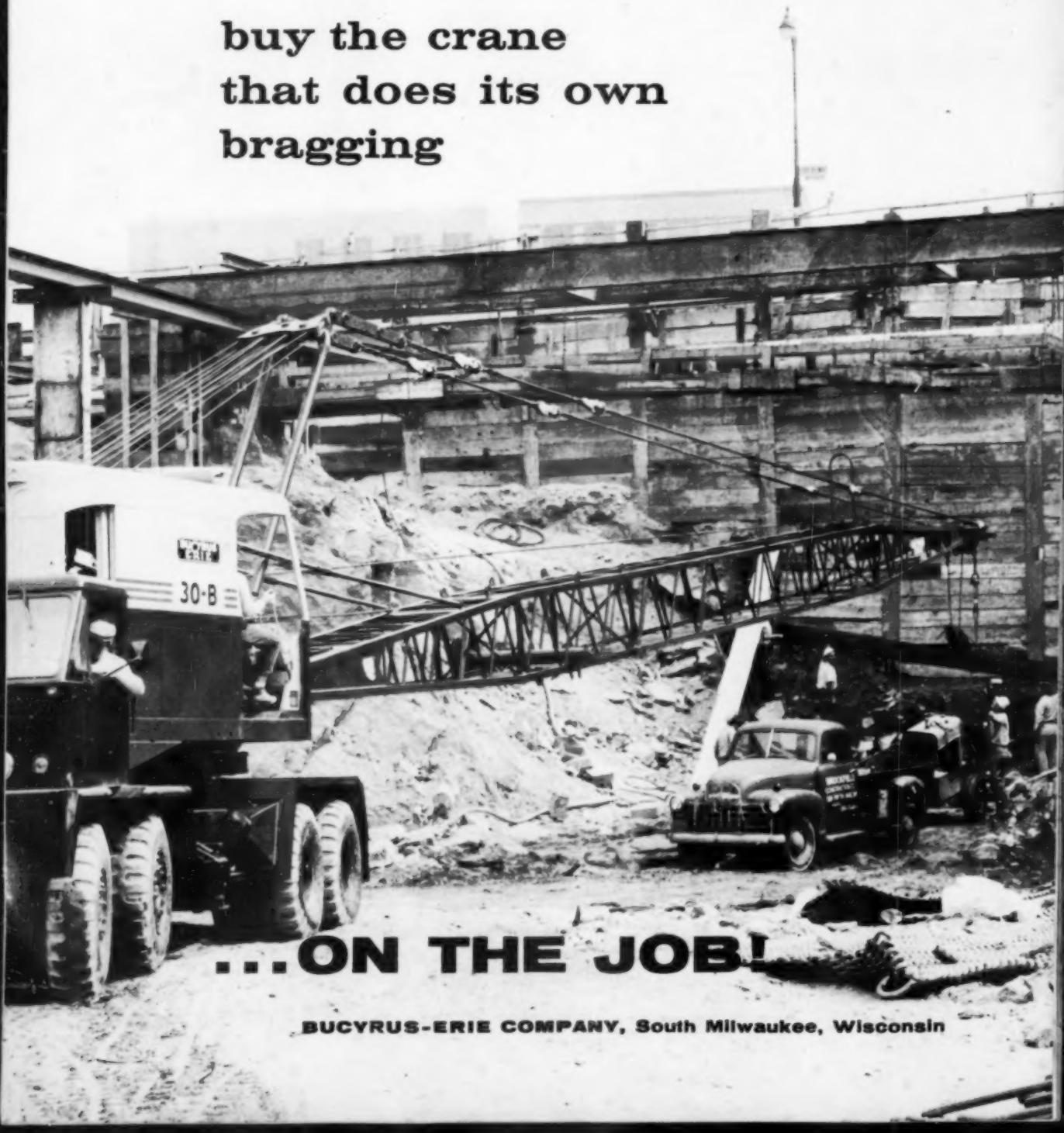

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